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Full Length Research Paper

Maternal mortality and emergency obstetric care in Benin City, South-south Nigeria

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To estimate the maternal mortality ratio, identify the contribution of Type III delays and assess the status of emergency obstetric services in a Nigerian Teaching Hospital, service delivery records of all maternities over 2 years were analyzed. Emergency care facilities in the hospital were physically verified and 10 senior medical/midwifery staff was interviewed in-depth. The maternal mortality ratio was 2,356/100,000 deliveries. The leading causes of death were HIV/AIDS (20.2%), eclampsia (12.4%), puerperal sepsis (11.9%), unsafe abortion (9.5%), and postpartum hemorrhage (4.8%). Associated causes of death were Type III delay (61.9%), Type I delay (28.6%), Type II delay (0%) and 9.5% of the women had no delay. Type III delay was due largely to delayed referral. Other causes were lack of blood, oxygen and necessary equipment in the hospital. Although the hospital had relevant emergency obstetric care facilities, there is inadequate midwifery staff, blood, oxygen supplies and intensive care facilities. Tertiary health institutions engaged in maternity care in Nigeria should step up their emergency obstetric services and reach out to other care providers to build greater understanding of issues relating to safe motherhood.

Key words: Maternal mortality, Nigeria, emergency obstetrics care, safe motherhood, millennium development goals, Type III delay.

INTRODUCTION

Current estimates indicate that Nigeria has one of the highest rates of maternal mortality in the developing World (Who, 2004). Available national statistics derived from use of the "sisterhood method" puts her maternal mortality rate at 800 per 100,000 live births (National Planning Commission, 2001). However, this method has been criticized due to associated poor recall of mode of deaths by respondents and the inadequate coverage of rural communities with high rates of maternal deaths. Hence, the current estimates of maternal mortality in Nigeria may be grossly underestimated. Estimates derived from health institutions, although less representative of national levels, are more suitable for rapidly assessing progress being made to reduce maternal mortality.

With an estimated 52,000 annual deaths, Nigeria contributes 10% to annual estimates of maternal mortality (Shiffman and Okonofua, 2007), and is one country where progress must be made if the global Millennium Development Goals (MDG) target of reducing maternal mortality by 75% by the year 2015 would be achieved. However, recent reports from various health institutions in Nigeria indicate an increasing rate of maternal mortality (Adamu et al., 2003; Adegoke et al., 2007; Harrison, 2007; Abe and Omo-Aghoja, 2008), which is a sad reminder that unless things are better organized, Nigeria may not be able to achieve the maternal health related MDG.

According to Deborah Maine (1991), delays in the management of pregnancy complications are key determinants of maternal mortality in developing countries. Using this model, reports have shown that in Nigeria, Type I delay (failure to seek medical treatment in time)

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accounts for 40% of maternal deaths, while Types II (difficulty with transportation) and III delays (delay after the woman had arrived in a hospital) account for 20% and 40% respectively (Okonofua et al, 1992).

We believe that Type III delay can be reduced with the provision of quality emergency obstetric services in developing countries. Indeed, the aim of obstetric practice in developing countries should be to reduce the case-fatality associated with obstetric complications, with a determination that no pregnant woman who arrives in hospital alive should die because of inadequacies of the health care system.

In April 2007, the International Federation of Gynecology and Obstetrics (FIGO) in collaboration with the Society of Gynecology and Obstetrics of Nigeria (SOGON) began the implementation of a Saving the Mothers and Newborn project in Nigeria, with the broad objective to improve emergency obstetric care and reduce maternal mortality in selected hospitals in the country. The University of Benin Teaching Hospital (UBTH) was one of the three tertiary health institutions selected for the project in Nigeria. As part of implementing the project, we conducted a needs assessment on maternal mortality and emergency obstetric care in the hospital, the results of which form the basis of this paper. The aim of this study therefore was to assess the level of maternal mortality at the University of Benin Teaching Hospital in Nigeria, identify the contribution of Type III delays to the deaths, and assess the provision of emergency obstetric services in the hospital. We believe that the results will assist in designing programs to improve emergency obstetric services, reduce Type III delays and reduce maternal morbidity and mortality in the hospital.

PATIENTS AND METHODS

This study was undertaken at the University of Benin Teaching Hospital (UBTH), Benin City, Nigeria. The UBTH is a 600-bedded hospital located in Benin City, capital of Edo State. The hospital provides tertiary maternity care, and is the main referral hospital for a population of nearly 2 million people. We reviewed maternity records between January 1, 2005 and December 31, 2007, to determine current trends in the maternal mortality ratio in the hospital, the medical causes of deaths, and the contributions of the three Types of delays to maternal deaths. Delays were identified from detailed notes taken and documented during the management of the pregnant women in the hospital. In addition, since the past 12 years, the Department of Obstetrics and Gynecology of the hospital has conducted daily clinical audits and reviews on all deliveries and all pregnant women managed in the hospital, as well as monthly reviews of all maternal deaths. The reports of these reviews as well as a departmental computer data-base record of all deliveries taken in the hospital during the period were reviewed as part of this assessment. The relevant information obtained were extracted using a study sheet designed for this purpose and the data were extracted personally by the authors.

To determine the availability of emergency obstetric care in the hospital, we undertook a site inspection of the maternity unit of UBTH and objectively reviewed the status of all existing facilities for providing optimal maternity care in the hospital in terms of their availability, adequacy and quality. Additionally, we interviewed 10 senior medical and midwifery staff who were selected based on the fact that they were senior administrative staff of the hospital or were in-charge of the respective units directly involved with rendering services that impacted on safe motherhood in the hospital, to determine their perceptions relating to the availability and quality of emergency obstetric services in the hospital and their opinions on ways to improve the situation. Those interviewed included: the Chief Medical Director, the Chairman Medical Advisory Committee, the Assistant Director of Nursing Services, Head of Department of Obstetrics and Gynecology, Professor and Head feto-maternal unit, the Chief Nursing Officer in-charge of labor ward, Head hematology and blood transfusion unit, the Chief Nursing Officer in-charge of labor ward theater, Consultant Anesthetist in-charge of labor ward and the Chief Resident of the department of Obstetrics and Gynecology. Three principal questions were asked during the in-depth interviews. These were: 1) how serious is the problem of maternal mortality in this hospital?; (2) how prepared is the hospital to handle emergency obstetric complications that lead to maternal death, and what is the state of emergency obstetric care in this hospital?; and (3) what are your recommendations on ways to improve emergency obstetric care and reduce case fatality associated with obstetric complications in this hospital? The interviews which lasted about an average of 30 min each was personally undertaken by the researchers taking into cognizance the caliber of the persons being interviewed and the technicality involved in an interview of this nature. The interviews were audiotaped and the discussions were then transcribed and analyzed for both content and form to make inferences and conclusions.

The quantitative data were analyzed with Epi-Info software, and univariate and bivariate tables were generated for assessment and comparisons. Statistical comparisons of rates and proportions were made with Chi-Square test, with Yates correction as appropriate. By contrast, in-depth interviews were audio-taped, and transcribed. The transcripts were thereafter analyzed for both form and content, and the results presented and reported qualitatively.

RESULTS

A total of 3,681 women were delivered in the hospital during the study period (Table 1), with 84 maternal deaths, giving a maternal mortality ratio (MMR) of 2,282 per 100,000 deliveries. MMR declined slightly from 2,356/100,000 in 2005 to 2,221/100,000 in 2006; however, the difference was not statistically significant ($P > 0.05$).

Nearly 60% were aged 25 - 34 years; 4.8% of the women were aged < 20 years; while 7.2% were aged $\geq$ 40 years. Most of the women (94%) had either a primary or secondary education; only one woman had no formal education; while 4.8% had tertiary level education. Nearly 87% of the women were married, while 13.1% were unmarried. Only 17.9% of the women were employed as skilled or professional workers. The rest were unskilled workers, unemployed housewives and students (Table 2).

Complications of HIV/AIDS were the leading causes of death, accounting for 20.2% of the maternal deaths. This was followed by eclampsia (12.4%), puerperal sepsis (11.9%), complications of unsafe abortion (9.5%) and postpartum hemorrhage (4.8%). Other leading causes of maternal mortality were ruptured uterus, anesthetic complications, antepartum hemorrhage, acute renal failure,

Table 1. Maternal mortality statistics at UBTH, Edo State.

Year	2005	2006	Total
Total deliveries	1655	2026	3681
Maternal deaths	39	45	84
Estimated MMR/100,000 births	2356	2221	2282

Table 2. Socio-demographic characteristics of maternal deaths at UBTH, Edo State.

Characteristics	N = 84 (%)
Age	
15 - 19	4 (4.8)
20 - 24	10 (11.9)
25 - 29	25 (29.8)
30 - 34	24 (28.5)
35 - 39	15 (17.8)
40 - 44	4 (4.8)
45 - 49	2 (2.4)
Educational status	
None	1 (1.2)
Primary	37 (44.0)
Secondary	42 (50.0)
Tertiary	4 (4.8)
Marital status	
Married	73 (86.9)
Single	11 (13.1)
Occupation	
Professional	2 (2.4)
Skilled worker	13 (15.5)
Unskilled worker	36 (42.8)
Housewife	23 (27.4)
Student	9 (10.7)
Unemployed	1 (1.2)

anemia and meningitis (Table 3). Puerperal sepsis had the highest case fatality of 40.0%, followed by ruptured uterus (27.3%), eclampsia (15.9%), HIV/AIDS (10.1%) and post-partum hemorrhage (8.7%).

Complications of unsafe abortion had a low case fatality rate of 3.3% despite the high number of women (246) managed with this complication in the hospital during the period. Also, 127 women with obstructed labor were managed in the hospital with no single maternal death (Table 4).

Over 78% of the 84 women who died received ante-natal care (ANC), while up to 21.4% did not receive ANC anywhere among the 66 women who received ANC, 4 women (6.1%) received ANC at the UBTH; 56 (84.8%) received ANC in a private or public hospital of lower status; while 5 women (7.6%) received ANC in a hospital of same status as the UBTH. One woman received ANC in a Primary Health Care Centre (Table 5).

Among the 84 women who died, 78 (92.9%) were referred as complicated cases having began labor from outside the hospital. Only 6 (7.1%) women began labor *de novo* at the UBTH. Of the 78 referred women, 49 (62.8%) were referred from private hospitals, while 13 (16.7%) came from home after having attempted to deliver themselves at home. 5 (6.4%) others were referred from public hospitals of lower status than UBTH, and 2 (2.5%) from Primary Health Centres. Only one woman was referred from a traditional birth attendant (Table 5).

Type III delay was the most frequent background cause of maternal deaths, occurring in 61.9% of cases, while Type I delay occurred in 24 (28.6%) of the cases. There were no recorded cases of Type II delay, while no delays were recorded in 8 (9.5%) women (Table 6). The most common (92.4%) cause of Type III delay was the delayed referral from private hospitals. Other causes were the lack of blood (2 cases), lack of oxygen (one case), and lack of necessary back-up equipment (one case).

The in-depth interviews conducted indicate that many believe that the hospital is adequately equipped to handle emergency obstetric complications at the tertiary level. However, there was consensus of opinion that maternal mortality has been rising in the hospital in recent times due to factors not immediately under the control of the hospital. The key informants corroborated the results of the survey by identifying sepsis, eclampsia and HIV/AIDS as the main causes of maternal deaths in the hospital. Additionally, they also identified several background social factors as contributing to these deaths. These include poverty, which prevents women from seeking appropriate health care in time when they experience pregnancy complications. Poverty was also identified by many of the respondents as the main reason that pregnant women patronize health institutions of lower status.

Overall, the quality of emergency care in the hospital was assessed by the respondents as satisfactory. It was reported that the hospital has suitably qualified medical and nursing staff on 24 h emergency obstetric coverage in the hospital, with availability of suitable drugs (such as oxytocin, misoprostol and magnesium sulphate) and relevant supplies. The hospital has emergency packs for caesarean section and minor operative procedures, and has 24 h coverage by qualified anesthetists, hematology and blood transfusion and other laboratory support units. The hospital also has an intensive care unit and facilities such as ultrasound, CT-Scan, renal dialysis and adequate back-up supports from relevant medical and surgical units. Additionally, the hospital has a back-up power supply when the main electricity from the central power grid fails and regular clean water supply to the labor ward and operating theaters.

However, the main challenges in provision of emergency

Table 3. Medical causes of maternal mortality at UBTH, Edo State.

Characteristics	N = 84 (%)
Severe pregnancy induced hypertension/Eclampsia	18 (12.4)
HIV/AIDS in pregnancy	17 (20.2)
Puerperal sepsis/Septicemia	10 (11.9)
Complicated abortion	9 (9.5)
Postpartum hemorrhage	4 (4.8)
Rupture uterus	3 (3.5)
Anesthetic complication	3 (3.5)
Antepartum hemorrhage	2 (2.4)
Acute renal failure	2 (2.4)
Anemic heart failure	2 (2.4)
Meningitis	2 (2.4)
Others*	13 (15.6)

*Transfusion reaction, amniotic fluid embolism, diabetic keto-acidosis, septic embolism, ectopic pregnancy, congestive cardiac failure secondary to valvular heart disease, pulmonary oedema, acute viral hepatitis, aplastic anemia, liver cancer, leiomyosarcoma in pregnancy, gullain barre syndrome, invasive mole.

Table 4. Case fatality of maternal deaths at the UBTH (2005 – 2006).

Maternal complications	No. of cases managed	No. of maternal deaths	Case fatality rate %
Eclampsia	113	18	15.9
Post partum hemorrhage	46	4	8.7
Antepartum hemorrhage	95	2	2.1
Obstructed labor	127	0	0
Ruptured uterus	11	3	27.3
Abortion complications	246	8	3.3
Puerperal sepsis	25	10	40.0
HIV/AIDS	169	17	10.1

obstetric care in the hospital identified by the informants were the less than efficient ambulance service, poor communication services to enable prompt reaction to emergencies, poor interdepartmental teamwork, limited operating theater spaces, suboptimal intensive care unit, insufficient dialysis machines and limited blood banking services. Nursing and midwifery staffs were also reported as being insufficient to cover the large number of obstetric emergencies treated in the hospital.

The recommendations made by the respondents for reducing maternal mortality ratio in the hospital were to find ways to encourage early referral of difficult obstetric cases by other health institutions, the improvement of blood banking and emergency/intensive care facilities in the hospital and more broadly, the institution of free maternity services at regional and national levels.

DISCUSSION

The study was designed to determine current trends in maternal mortality at the UBTH and to identify various background factors that need to be acted upon to reduce the MMR in the hospital. Previous reports from UBTH (Unuigbe et al., 1988) and a mission hospital in Benin City (Olusanya and Amiegheme, 1988) gave MMRs of 563/100,000 deliveries and 334/100,000 deliveries respectively. Thus, our present report of 2,282/100,000 deliveries shows a 4-fold increase in maternal mortality in the hospital over a 20 year period, and the current figures are some of the highest ever reported from this region of Nigeria.

In 2004, SOGON conducted a survey of maternal mortality in six teaching hospitals across Nigeria (SOGON, 2004). The results showed that MMRs in the hospitals were: Maiduguri, 727; Enugu, 783; Jos, 846; Calabar, 2,977; Lagos, 3,380 and Kano, 7,523/100,000 deliveries. Furthermore, a report published in October 2007 (Ozumba and Nwogu-Ikojo, 2008) has since reported a MMR of 2,397.3/100,000 in Enugu Teaching Hospital. These persisting and increasing rates of maternal mortality in Nigeria calls for renewed efforts to reverse the trend.

This study showed that a significant proportion of the

Table 5. Sources of maternity care for cases of maternal deaths at UBTH, Edo State.

Characteristics	N = 84(%)
Received antenatal care	66 (78.6)
Not received antenatal care	18 (21.4)
Place of antenatal care	
The same hospital	4 (6.1)
A hospital of lower status	56 (84.8)
A hospital of same status	5 (7.6)
A hospital of higher status	0 (0.0)
Church clinic	0 (0.0)
Others	1 (1.5)
Referred patients	78 (92.9)
Not referred patients	6 (7.1)
Referred source	
Public hospital of lower status	8 (10.3)
Public hospital of higher status	0 (0.0)
Public hospital of same status	5 (6.4)
Private hospital	49 (62.8)
Private nurse/midwife	0 (0.0)
TBA	1 (1.3)
Church	0 (0.0)
Mosque	0 (0.0)
Health centre	2 (2.5)
Others (Self referral)	13 (16.7)

Table 6. Types and causes of delays in maternal deaths at UBTH, Edo State.

Characteristics	N = 84 (%)
Types of delay	
None	8 (9.5)
Type I	24 (28.6)
Type II	0 (0.0)
Type III	52 (61.9)
Causes of Type III delays	
Delay referral	48 (92.4)
Lack of blood	2 (3.5)
Lack of oxygen	1 (1.8)
Lack of equipment	1 (1.8)
Lack of light	0 (0.0)
Lack of water	0 (0.0)
Inability to pay hospital fees	0 (0.0)
Inability to do urgent investigation	0 (0.0)
Staff busy	0 (0.0)

maternal mortality at the UBTH over the study period was due to the high number of women who died from complications of HIV/AIDS during pregnancy. The hospital was designated an HIV/AIDS counseling, screening and treatment centre by the Federal Ministry of Health in 2003, where free treatment is offered to all persons with HIV/AIDS with increased referrals from other health institutions. This probably explains the high recorded maternal mortality due to HIV/AIDS (n = 17 deaths). It is possible that current efforts being directed at increasing women's awareness of the prevention and treatment of HIV/AIDS in Nigeria and the early testing and treatment in the hospital will reduce the number of maternal deaths attributable to HIV/AIDS.

The results also revealed persisting high rate of maternal mortality attributable to sepsis, ruptured uterus, eclampsia and postpartum hemorrhage. These medical causes were associated with high case fatality rates and this we found to be mainly due to delayed referral. Although the hospital also suffered some limitations in terms of oxygen and blood supply, but these were less profound compared to the delay suffered by parturients in the hands of care providers. The results of the analysis of the records as well as in-depth interviews conducted showed that many women with complications were referred late from health institutions, and in extremis, when it became extremely difficult to manage the complications and save women's lives.

The problem of poor organization and access to maternity health services has always been a major challenge in Nigeria (Harrison, 1985; Galadanci et al., 2007; Osubor et al., 2006). Maternity care in Nigeria is organized around three tiered levels: primary, secondary and tertiary care levels. To ensure access to evidence-based maternity services to all women, primary health care centres are located in all the 774 Local Government Councils in the country. Pregnant women are supposed to receive antenatal, delivery and post-natal care in the Primary Health Centres nearest to them and only when they experience severe complications would they be referred to secondary care centres (managed by States) or tertiary care centres (managed by the Federal Government). Maternity services are also provided by several private health institutions, who are also supposed to refer severe complications to secondary and tertiary care centres. In Benin City, up to 50% of maternity care is provided by registered private health institutions. Despite this well conceived system, the problem has been that the referral system is very poorly organized, with poor communication and inadequate means of transportation between health institutions. Thus, delays in referrals have been a common feature of maternity services in Nigeria as epitomized in this report, and contribute significantly to maternal mortality. Clearly, there is a need to determine the causes of delayed referrals by health institutions and to identify ways to improve the situation. However, we believe that re-training programs directed at private and public health providers at the primary and secondary care levels will contribute to solving the problem.

In sum, the major challenge currently facing the hospital

is how to reduce maternal mortality despite the persisting late presentation of women with severe complications in the hospital. The situation calls for the improvement of emergency obstetric services in such a way that even the most serious complications can be promptly managed in the hospital. The hospital must take steps to improve its emergency care facilities, increase the number of trained midwifery staff, and also improve its communication and transportation systems. Additionally, the concept of safe motherhood must be made multi-disciplinary in the hospital (some of the most relevant departments include Anesthesia, Hematology and blood Transfusion, Radiology, Medicine - especially renal dialysis unit, and Surgery), and should include the retraining, motivation and sensitization of all staff in all relevant departments of the hospital. In particular, all staff working in the maternity unit should be re-trained on new evidence-based methods for preventing maternal mortality. Protocols for managing the common obstetric complications should be prepared and boldly displayed in all relevant departments of the hospital.

Finally, the hospital should endeavor to run a community extension service to reach out to health institutions providing maternity care in their catchment area, to build their knowledge of evidence-based methods of managing labor and obstetric complications. This will increase the likelihood that such institutions will refer patients early.

In conclusion, maternal mortality has increased four-fold at UBTH in Nigeria, over a 20 year period. The major causes of maternal mortality were HIV/AIDS, eclampsia, puerperal sepsis and postpartum hemorrhage. The delayed referral of serious obstetric complications from surrounding health institutions contributed significantly to these deaths. These results have implications for tertiary health institutions engaged in providing maternity care to a large catchment area in Nigeria. Such institutions should step up their emergency obstetric services and endeavor to reach out to other care providers within and outside their hospitals to build greater understanding of issues relating to safe motherhood.

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