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Full Length Research Paper

The burden of maternal mortality in a semi urban Nigerian town: Five year experience

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Pregnancy is one of the most important periods in the life of a woman, but it can unpredictably at times be affected by obstetrics complications thereby leading to the death of women either directly or indirectly during antenatal period, labour or in the puerperium. This study aims to determine the magnitude and causes of maternal deaths in a tertiary hospital. This is a five-year retrospective descriptive analysis of all cases of pregnancy related maternal deaths at the Niger Delta University Teaching Hospital Okolobiri, Bayelsa State, in the Niger Delta of Nigeria. There were 13 maternal deaths and a total of 1812 live births during the study period giving a maternal mortality ratio of 717.4 per 100,000 live births. Major causes of deaths were sepsis 6 (50.0%) and pre-eclampsia/ eclampsia 4 (33.3%). Maternal death was more likely to occur in the unbooked (p ; 0.001; 95% CI ; 0.02 to 0.51), between ages 19 to 23 years (p; 0.035; 95% CI ,0.918 to 11.615), in women of high parity (p ; 0.000; 95% CI ; 0.00 to 0.08)and in the unemployed(x^2 = 28.198; df = 5; p = 0.000). There is an urgent need to address and improve on the quality of care given to unbooked emergencies in our institution. In addition other preventable social causes need to be tackled.

Key words: Maternal mortality, causes, Niger Delta, Nigeria.

INTRODUCTION

A very important index of quality of obstetric care is the maternal mortality ratio (MMR), which is usually stated as the number of maternal deaths per 100,000 live births (Hill et al., 1995). In sub-Saharan Africa, the life time risk of maternal death is 1 in 16 compared to 1 in 2,400 in Europe and the maternal mortality ratio is about 920 per 100,000 live births (Moran et al., 2006). Furthermore, most of these deaths are preventable if timely decisions are taken.

In order to raise awareness about the scope and consequence of poor maternal health and to mobilize action to address the high rates of death and disability from the complications of pregnancy and childbirth, many attempts were made at different times and these included programs such as: The Global Safe Motherhood Initiative (SMI), Prevention of Maternal Mortality PMM (1987 to 1997); Mother care project (1988 to 1998); the Care project (1945) by the One Academy Communication, Change Project (1998 to 2005), Maternal and Neonatal Health MNH (1998 till date) by John Hopkins' Program for International Education in Gynaecology and Obstetrics (JHPIEGO) and the millennium development goals (MDG 5) that were set at the turn of the century with a target date of 2015 (Roxana and Barco, 2004). However, not much progress has been made towards achieving the fifth millennium development goal; this has been linked to the slow progress made by the developing countries (Shah and Say, 2007).

Accurate data on the number and factors that determine poor maternal outcome are often not available in most developing countries; this has adversely affected the way and manner that resources are distributed. Furthermore, majority of data on maternal deaths are hospital based due to economic, socio-cultural and infrastructural factors that have made national data to be

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scarce and unreliable (Graham et al., 1989; Kampikaho and Irwig, 1991). However, hospital-based data can provide a great deal of useful information and the studies are much easier to perform despite their limitations (Geelhoed et al., 2003).

Historical evidence shows that no country has managed to bring its maternal mortality rate below 100/100,000 live births without ensuring that all woman are attended to by an appropriate skilled health professional during labour, birth and puerperium, on this basis it was agreed at United Nations General Assembly in 1999 that globally 80, 85 and 90% of all births should be assisted by skilled health attendants by the year 2005, 2010 and 2015 respectively (WHO, 1999). In Nigeria, it was estimated that only about 60% of women have access to the antenatal care and about 31% deliver in health care facilities (Lindroos and Luukkainen, 2004). However, majority of maternal mortality occur within hospitals (Ibekwe and Dimejesi, 2008; Tukur et al., 2008).

The causes of maternal mortality are similar worldwide; however, lack of education, poverty, and destructive cultural beliefs, lack of infrastructure and man power further worsens the problem in developing countries (Adelaja and Taiwo, 2011). Furthermore, delays at various levels have contributed to the high maternal mortality in developing countries. Studies have shown that delay at first phase (delay in recognizing problems such as danger signs) account for 33%; second phase delay (delay in deciding to seek care) 40%; third phase delay (delay in reaching the health facility due to lack of transportation) 19% and fourth phase delay (delay in reviewing treatment) accounting for 8% of the maternal deaths (Dean et al., 1987).

This study presents the burden, trend and determinants of maternal mortality in the Niger Delta region, with recommendations on how to reduce the number of preventable maternal deaths in this part of Nigeria.

MATERIALS AND METHODS

This was a retrospective descriptive analysis of maternal deaths at the Niger Delta University Teaching Hospital (NDUTH), Okolobri, Bayelsa State. The medical records of women who had delivery at NDUTH and women who died in the obstetrics department between January 1st 2007 and December 31st 2011 were retrieved from the hospital medical records department and reviewed. Variables relating to the socio demographic characteristics of the women who died, the main causes of death, place of labor and delivery as well as duration of hospital stay before death were obtained. The total number of live births during the period of study was also documented. The relationship between maternal death, age, parity and antenatal booking status was determined. Due to cultural and religious beliefs in our society, permission for autopsy is not often obtained, thus the diagnosis and circumstances surrounding each death are derived from a brainstorming session during the monthly departmental maternal mortality reviews. The information obtained were coded and transferred onto a profoma already design for the study.

Statistical analysis was performed with Statistical Package for Social Sciences (SPSS version 10) where nominal data were compared using the chi square test (x2) and the difference between means determined by the students t- test with the level of significance set at $\alpha = 0.05$. . Comparison of categorical variables was by computing the odds ratio (OR) at 95% confidence limits. Approval for this work was given by the Ethical Committee of the Niger Delta university teaching hospital. The following Operational definitions were used during the conduct of this study:

Maternal death: Is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

Maternal mortality ratio: Defined as the number of maternal deaths per 100,000 live births over a given period.

Traditional birth attendants (TBA): Refers to traditional, independent, non-formally trained and community-based providers of care during pregnancy, childbirth and the postnatal period.

RESULTS

A total of 1812 cases were reviewed in this study which revealed 13 maternal deaths with a maternal mortality ratio of 717.4/100,000 live births. There were no post-mortem examinations of the maternal deaths due to strong objection by the relatives. Table 1 shows the socio-demographic characteristics of the women reviewed in the study. The age range was from 18 to 39 years with a mean age of 26.9 ± 6.5 years in the cases where mortality was recorded and 27.4 ± 6.0 years in the group who had safe delivery. Majority of the maternal deaths 6 (46.2%) occurred in women aged 20 to 25 years while about a quarter of the women were Primigravidae. About 6 (46.2%) of those who died had completed at least secondary education, while only 1(8.3%) had tertiary level of education. In total, 8 (61.5%) of the women were married, and 4 (33.3%) were cohabiting. Majority were unemployed 6 (46.2%) and 11(84.6%) had no documented antenatal care and were brought in as unbooked emergencies. There was no statistically significant difference in the age ($t = 0.30$; $df = 1810$; $p = 0.765$), parity ($x^2 = 1.299$; $df = 2$; $p = 0.522$), educational status ($x^2 = 3.492$; $df = 2$; $p = 0.322$) and marital status (x^2

Table 1. Socio-demographic characteristics of patients.

Characteristic	Mortality cases f (%)	Safe / normal delivery cases f (%)	Total f (%)
Age			
≤19	1 (7.7)	113 (6.3)	114 (6.2)
20-25	6 (46.2)	727 (40.4)	733 (40.5)
26-30	3 (23.1)	491 (27.3)	494 (27.3)
31-35	2 (15.3)	347 (19.3)	349 (19.3)
>35	1 (7.7)	121 (6.7)	122 (6.7)
Total f (%)	13 (0.7)	1799 (99.3)	1812 (100)
Mean age (x ±SD) =	26.9 ±.5	27.4 ± 6.0	
t =	0.30 ; df =	p = 0.765	
Parity	1810;		
0	3 (23.1)	523 (29.1)	526 (29.0)
1 – 3	6 (46.2)	943 (52.4)	949 (52.4)
≥4	4 (30.7)	333 (18.5)	337 (18.6)
Total f (%)	13 (0.7)	1799 (99.3)	1812 (100)
x^2 =	1.299; df = 2;	p = 0.522	
Educational status			
No formal education	3 (20.1)	264 (14.7)	267 (14.7)
Primary level education	3 (20.1)	397 (22.1)	400 (22.1)
Secondary level	6 (46.1)	593 (32.9)	599 (33.1)
Education			
Tertiary level education	1 (7.7)	545 (30.3)	546 (30.1)
Total f (%)	13 (0.7)	1799 (99.3)	1812 (100)
x^2 =	3.492; df = 3;	p = 0.322	
Booking status			
Booked	2 (15.4)	1029 (57.2)	1031 (56.9)
Unbooked	11 (84.6)	770 (42.8)	781 (43.1)
Total f (%)	13 (0.7)	1799 (99.3)	1812 (100)
x^2 =	7.576; df = 1;	p = 0.006	
Marital status			
Married	8 (61.5)	1236 (68.7)	1244 (68.7)
Cohabiting	4 (30.8)	399 (22.2)	403 (22.2)
Single	1 (7.7)	164 (9.1)	165 (9.1)
Total f (%)	13 (0.7)	1799 (99.3)	1812 (100)
x^2 =	0.513; df = 2;	p = 0.774	
Occupation			
Unemployed	4 (30.7)	326 (18.1)	330 (18.2)
Civil servant	0 (0)	572 (31.8)	572 (31.6)
Business	0 (0)	534 (29.7)	534 (29.5)
Petty trader	5 (38.5)	133 (7.4)	138 (7.6)
Housewife	2 (15.4)	167 (9.3)	169 (9.3)
Farmer	2 (15.4)	67 (3.7)	69 (3.8)
Total f (%)	13 (0.7)	1799 (99.3)	1812 (100)
x^2 =	28.198; df = 5;	p = 0.000	

Table 2. Causes of maternal death.

Cause of death	Frequency (%)
Pueperial sepsis	6 (46.2)
Eclampsia	4 (30.7)
Postpartum haemorrhage	1 (7.7)
Septic abortion	2 (15.4)
Total	13 (100)

Table 3. Age, parity and booking status specific maternal mortality rate.

	Live births	Maternal death	Age specific MMR
Age			
< 19	118	1	847.5/100,000
20-25	365	6	1666.7/100,000
26-30	774	3	387.6/100,000
31-35	369	2	542.0/100,000
> 35	186	1	537.6/100,000
Total	1812	13	717.4/100,000
	Likelihood ratio $x^2 = 3.304$	p = 0.508	
Booking status			
Booked	1135	2	176.2/100,000
Unbooked	677	11	1624.8/100,000
Total	1812	13	717.4/100,000
	x^2 (with Yate's correction) = 8.692	p = 0.003	
Parity			
0	377	3	795.7/100,000
1 – 3	871	6	688.9/100,000
≥4	564	4	709.2/100,000
Total	1812	13	717.4/100,000
	$x^2 = 0.221$	p = 0.895	

= 0,513; df = 2; p = 0.774) of the cases reviewed. However, there was a statistically significant difference in the booking status (x^2 = 7.576; df = 1; p = 0.006) and occupation (x^2 = 28.198; df = 5; p = 0.000).

Table 2 shows the medical causes of death. Puerperal sepsis was the largest single cause of death, accounting for 6(46.2%) of the maternal mortality, followed by Eclampsia accounting for 4 (30.8%) of the mortality while unsafe abortion and postpartum haemorrhage accounted for 2(15.4) and1 (7.7%) respectively.

Table 3 displays the age specific maternal mortality ratios (MMR) in relation to the parity and the booking status of the cases. The MMR was highest for those aged 20 to 25 years and lowest for those aged 26 to 30 years. Analysis of maternal mortality in the age range of 19 to 25years against those 26 years and above indicates that the maternal mortality is more likely to occur in those between ages 19 to 23 years (OR = 3.17; Fisher's p = 0.035; 95%CI = 0.918 – 11.615).

Majority of the women, 11 (84.6%) were unbooked with a MMR of 1624.8/100, compared with MMR of 176.2/100,000 in the booked. Considering the booking status of the cases, there was a statistically significant difference in the maternal mortality ratio (x^2 = 8.692; p = 0.003; α = 0.05). Further analysis revealed that maternal mortality in women who were booked was less likely to occur when compared with women who were unbooked for antenatal care (OR = 0.11; Fisher's p = 0.001; 95% CI = 0.02 – 0.51).

The MMR was lowest in the para 1 to 3 and highest in Para 0. Comparison of the maternal deaths and number of live births for the parity groups did not show any statistically significant difference (χ^2 = 0.221; p = 0.895; α = 0.05). However, analysis of maternal mortality in women Para 0 to 3 against women Para 4 and above indicates that maternal mortality is less likely to occur in

Table 4. Duration of hospital stay/place of delivery before death.

Duration (hours)	Frequency (%)
< 24	3 (23.1)
24- 48	7 (53.8)
72-120	2 (15.4)
>120	1(7.7)
Total	13 (100)
Place of delivery	
Home	7 (53.8)
Traditional birth attendant (TBA)	2(15.4)
Private hospital	2 (15.4)
Same hospital	2 (15.4)
Total	13 (100)

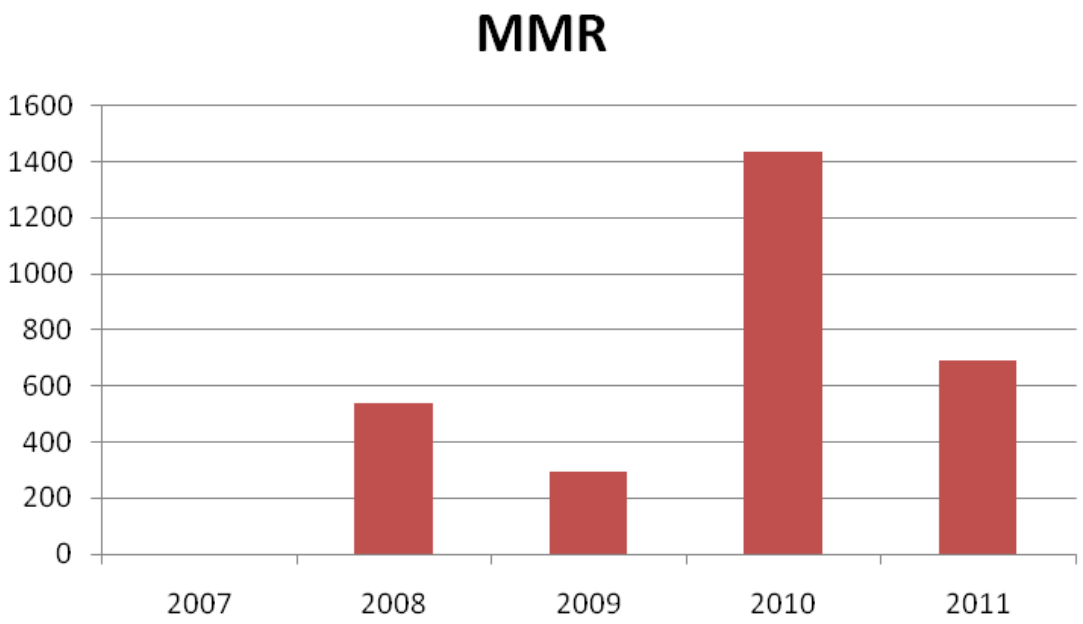

Figure 1. Annual trend in MMR in NDUTH, 2007 to 2011.

those between Para 0 to 3 as compared to those Para 4 and above (OR = 0.02; Fisher's p = 0.000; 95% CI = 0.00 – 0.08).

Table 4 shows the duration of hospital stay and place of delivery/ initial care before death. Most of the women delivered either at home or at the place of a traditional birth attendant where they receive little or no care 9 (69.2); majority of them 7 (53.8) died within 48 h of admission.

Figure 1 shows the annual trend in the MMR. The MMR peaked in 2010 (1434.4/100, 000) but dropped to 692.8/100, 000 in 2011.There was however no significant difference in the MMR per year.

DISCUSSION

The results show that maternal death remains a major public health issue in our environment, in view of the maternal mortality ratio of 717.4 per 100,000 live births obtained for the 5 year review period. Although this figure is lower than the figures obtained from other centers in Nigeria (Agan et al., 2010; Oladapo et al., 2006), it is unacceptably high compared with what is obtainable in industrialized countries (Athol, 2010). This may be attributed to the low number of institutional deliveries and the fact that majority of the women were brought in as unbooked emergencies 11 (84.6%) after attempting

delivery at the place of a traditional birth attendant or at home.

The majority 8(65.7%) of those who died were within the age group of 20 to 30 years. The age range, parity distribution, the demographic and obstetric characteristics obtained in this study is similar to findings from previous studies (Agan et al., 2010; Oladapo et al., 2006).

The review also revealed that, lack of antenatal care and unemployment are important socio-demographic factors contributing to maternal death. While 11(84.6%) of the patients were unbooked, 6 (46.2%) were unemployed. These findings were similar to other works which showed that maternal death are predominantly associated with the unbooked and the unemployed (Agan et al., 2010; Oladapo et al., 2006).

The importance of proper antenatal care and delivery with a skilled attendant is further heighted by the findings in this study, as MMR in the unbooked women is significantly higher when compared with the booked women. This is similar to findings from previous studies in this country (Ibekwe and Dimejesi, 2008; Tukur et al., 2008; Adelaja and Taiwo, 2011). The medical causes of maternal deaths in this study are not significantly different from those at other centers in Nigeria (Tukur et al., 2008; Adelaja and Taiwo, 2011; Agan et al., 2010). However, Puerperal sepsis was found to be the single leading cause of maternal mortality in this review, accounting for 6 (46.2%) of the maternal deaths. This may be due to the fact the majority of the women were unbooked, who attempted delivery either at home, or with a TBA, where they had several unsterile vaginal examinations in an unhygienic environment. It is the third leading cause of maternal death in Calabar and Shagamu in Nigeria respectively (Agan et al., 2010; Oladapo et al., 2006).

Hypertensive disorders of pregnancy are the second leading cause of death, accounting for 4 (30.8%) of the deaths in this study. This is different from findings from other centers in Nigeria, where it was found to the leading cause of death (Ibekwe and Dimejesi, 2008; Tukur et al., 2008; Adelaja and Taiwo, 2011). It is however similar to findings from another center in the same region (Agan et al., (2010).

In this study, two maternal deaths were recorded due to unsafe abortion (15.4%) and this was within the range reported for illegal abortion in another Nigerian study (8 to 35%) (Adefuye et al., 2003).

Majority of the deaths recorded in this study are preventable if appropriate interventions are put in place, and regrettably, neither special technology nor research are needed to prevent these deaths.

Conclusion

It can be concluded by the findings of this study that access of women in Niger Delta of Nigeria to proper antenatal care and emergency obstetrics services is still poor and it requires a pragmatic approach using public health measures. Primarily through education of the girl-child, educational programs to sensitize the community about the dangers of unsafe abortion and through tackling the unmet needs for contraception. Secondarily by making antenatal care free and accessible to all pregnant women, clean and safe delivery with a skilled attendant and provision of both basic and comprehensive emergency obstetric care services. As a long term measure, aggressive infrastructural development and manpower development will help to halt the stream of these preventable deaths.

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