Original Article

Maternal mortality ratio in a Tertiary Hospital offering free maternity services in South-western Nigeria – A five-year review

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ABSTRACT

Aim: To determine annual trends of maternal mortality ratio in a tertiary hospital offering free maternity services.

Settings and Design: This retrospective descriptive study was conducted at the Mother and Child Hospital Akure, Ondo State, a busy purpose-built tertiary care facility premised on evidence-based protocol management of patients and offering free consultations, admissions, drugs, laboratory tests, blood transfusions and surgeries.

Materials and Methods: Data were collected from available hospital records from inception on 24th February 2010 to 31st December 2014 and analysed using Microsoft Excel 2010 software.

Statistical Analysis: Data analysis was done using descriptive statistics. Categorical variables were expressed as frequency (percentage) and continuous variables as mean, median and range.

Results: In the 5-year period, antenatal registration was 49195; increasing from 7378 in 2010 to 12002 in 2013 (63% increase) before dipping to 9780 in 2014. Number of births was 30031; increasing from 3673 in 2010 to 7634 in 2013 (108% increase) before dipping to 6234 in 2014. The overall maternal mortality ratio was 383 per 100,000 births reducing from 708 in 2010 to 208 in 2014 (70% reduction). The most common causes of maternal deaths were postpartum haemorrhage (30%), eclampsia (29%) and uterine rupture (14%).

Conclusions: Over 5 years, a busy tertiary maternity centre premised on evidence-based protocol management of patients and offering free services had a sustained reduction in facility-based maternal mortality ratio. It is, therefore, recommended that the model be adopted in all public maternity centres.

Key words: Facility-based maternal mortality ratio; free maternity services; maternal death.

Introduction

The death of a woman while being pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes is generally regarded as maternal mortality.[1] Globally, an estimated 303,000 maternal deaths occurred in 2015, a decline of 43% from levels in 1990. In the same year of review, developing countries accounted for 99% (302,000 maternal deaths) of the deaths. At the country level, Nigeria carried the heaviest burden with 58000 deaths (19%).[2]

Maternal mortality ratio (MMR) is the number of maternal deaths per 100,000 live births during a time period.[2] The

Access this article online	
Website: www.tjogonline.com	**Quick Response Code**
DOI: 10.4103/TJOG.TJOG_27_17	

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How to cite this article: Oyeneyin LO, Akintan AL, Aderoba AK, Owa OO. Maternal mortality ratio in a Tertiary Hospital offering free maternity services in South-western Nigeria – A five-year review.Trop J Obstet Gynaecol 2017;34:XX-XX.

MMR in Nigeria was estimated to be 576 per 100,000 live births in 2013, an increase from 545 in 2008.[3] There is cause for concern when both are compared to the global averages of 210 per 100,000 in 2010[4] and 216 per 100,000 in 2015.[2]

Facility-based maternal mortality data help to compare notes among health institutions and shed light on the progress reports, or otherwise. The data serve to assist stakeholders, policy-makers and care providers in reversing the high figures. The impact of poverty, illiteracy, gender inequality and harmful traditional and cultural practices, as it relates to high MMRs, was empirically established in the facility-based Zaria Survey.[5] The study, more than any prior scientific work, gave an invaluable insight into the correlation between socio-economic indices and maternal health. It led to increased awareness and galvanised the eventual introduction of the defunct Safe Motherhood Initiative in 1987. Unfortunately, Nigeria was unable to leverage on this laudable programme and the state of the maternal health sector remained poor.[6]

The World Health Organisation (WHO) advocates for skilled attendance at every birth as a critical component of safe motherhood.[7] These healthcare professionals are readily available in tertiary hospitals. However, studies have shown that finances remain a barrier to accessibility to maternity services in hospitals, which is essential for improving maternal health.[8,9] There is paucity of literature from tertiary level facilities with encouraging results offering free maternity services in Nigeria. This study aims to determine the annual trends of MMR and associated parameters in such a facility.

Patients and Methods

This retrospective descriptive study was conducted at the Mother and Child Hospital Akure (MCHA), Ondo State in south-western Nigeria. It is a State-funded, purpose-built tertiary care facility premised on evidence-based protocol management of patients and offers free consultations, admissions, drugs, laboratory tests, blood transfusions and surgeries. According to the National Population Commission, the 2006 census places the state's population at approximately 3.4 million. The MCHA serves as the preeminent referral facility on maternity services in the State and receives patients from adjoining states.

Data were obtained from the admission/discharge registers, delivery records and retrieved case files from the hospital's health information management department dated from inception on 24th February 2010 to 31st December 2014. Data entry and analysis utilised Microsoft Excel 2010 software. Data analysis was done using descriptive statistics. Categorical variables were expressed as frequency (percentage) and continuous variables as mean, median and range. In the absence of routine postmortem examinations, the cause(s) of maternal death were based on clinical assessment and diagnosis. In any case with multiple pathologies, the condition that more likely led to the chain of events resulting in the demise was chosen as cause. Data presentation is through frequency tables, graphs and charts. Ethical approval for the study was obtained from the institutional ethics committee.

Results

The total number of antenatal registrations and births in the 5-year study duration was 49195 and 30031, respectively. During the same period, 115 maternal deaths were recorded. The annual trend for the numbers of maternal deaths is shown in Figure 1.

The calculated facility-based MMR for the period of study was 383 per 100,000 births. The annual trend of births showed a 108% increase from 2010 to 2013 followed by an 18% dip in 2014. The antenatal registrations also showed an increase of 63% from 2010 to 2013 followed by a dip in 2014. The MMR reduced by 70% from 2010 to 2014. Details of yearly trends are illustrated in Figure 2.

The characteristics of the maternal deaths showed that the age range of 21–30 years accounted for almost half of the deaths. Majority of the cases were of parities 1–4 (53.0%) and delivered vaginally (66.1%) [Table 1].

The most common causes of maternal deaths over the period of study were postpartum haemorrhage (30%), eclampsia (29%) and uterine rupture (14%). Others included overwhelming septicaemia, suspected thrombo-embolism and anaemic heart failure, accounting for the remaining 27%. This is summarised in Figure 3.

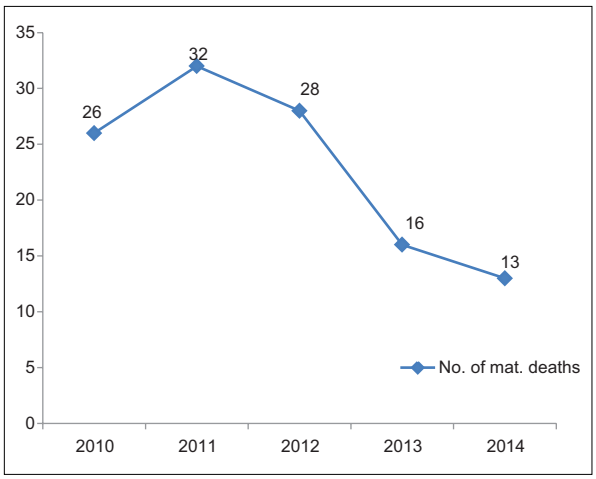

Figure 1: Distribution of number of maternal deaths by year

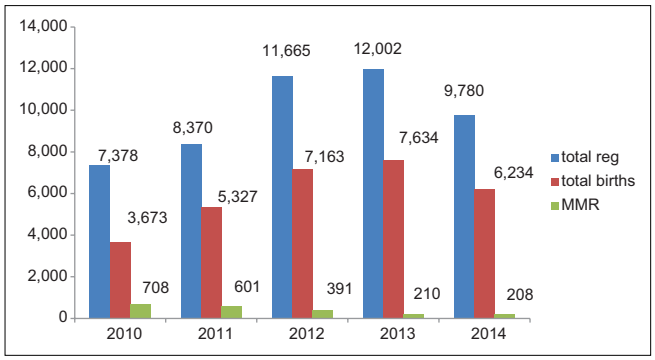

Figure 2: Distribution of antenatal registrations, Births and MMR by Year

Table 1: Characteristics of Maternal Deaths

Parameter	Frequency (%) *N*=115
Age (years)	
≤20	5 (4.34)
21-30	57 (49.57)
31-40	51 (44.35)
>40	2 (1.74)
Parity	
0	39 (33.91)
1-4	61 (53.04)
>4	15 (13.05)
Mode of Delivery	
Vaginal	76 (66.09)
Undelivered	15 (13.05)
Caesarean section	13 (11.30)
Laparotomy	11 (9.57)

Discussion

In this study, the overall MMR of 383 per 100,000 births was quoted for the MCHA with its large volume of deliveries in its first 5 years of operation. The MMR figure, for all intents and purposes, is the lowest from similar facility-based studies in Nigeria published in this millennium. In comparison, figures from two studies in the north-western region were 1625[10] and 2151.[11] Those conducted in the north-eastern quoted 430[12] and 2849.[13] The north-central region reported figures of 740[14] and 825.[15] In addition, figures from other institutions based in the south-western region recorded 963[16] and 2989,[17] those in the south-eastern had 645[18] and 1359[19] whereas the south-southern had 2232[20] and 2736.[21]

The 70% reduction in annual MMRs despite a 108% increase in births spanning 5 years was also a unique achievement in the literature. Some other facility-based studies showed upward trends in their reviews.[14,17] On the other hand, a study conducted in Enugu in south-eastern Nigeria showed a significant reduction in MMR following introduction of evidence-based clinical interventions.[18] Another study at a teaching hospital in Ebonyi State, also in south-eastern

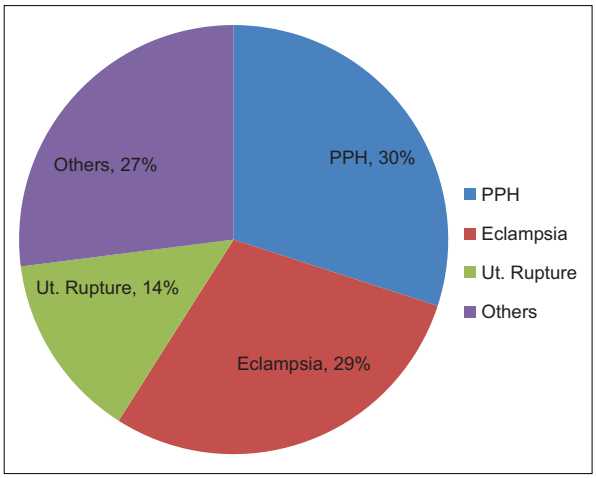

Figure 3: Distribution of causes of maternal deaths

Nigeria, showed a progressive decline in MMR when free maternity services were introduced.[19] These corroborate the achievement of the MCHA, which was a free tertiary care facility premised on evidence-based protocol management of patients from inception. The reduction in numbers of antenatal registrations and births in 2014 were ascribed to a cumulative 3-month shutdown period of hospital services as a result of nationwide industrial strike by different cadre of healthcare professionals. Despite the strike, annual maternal deaths and MMR maintained a downward trend.

This study showed that almost half of the included cases were aged between 21 and 30 years, coinciding with the peak of a woman's reproductive life when most conceive and are more prone to consequences. This is similar to studies from Kano,[10] Sagamu[17] and Abakaliki.[19] A review from Jos suggested the two extremes of reproductive age group were most vulnerable.[14] Patients with low parity (1–4) were also in the majority in this study. This was corroborated by studies in Kano,[10] Ibadan[16] and Enugu[18] but contradicted in Jos,[14] Sagamu[17] and Abakaliki[19] where grand-multiparas (>4) were the dominant group. The reason for the variations might not be easily explained as they do not appear to follow a geographical pattern.

In this study, vaginal route was the major mode of delivery similar to a review from Jos.[14] On the other hand, caesarean sections were more implicated in studies from Sagamu[17] and Abakaliki.[19] The differences might simply reflect the pattern of morbidities and threshold for operative deliveries in individual facilities.

The dominant causes of maternal death in this study, particularly postpartum haemorrhage, eclampsia, ruptured uterus and septicemia were similarly identified in other reviews.[10-19] It is, therefore, noteworthy that specific

evidence-based measures be taken at each facility to counter these preventable and often predictable conditions. A major limitation of this study is the absence of statutory post-mortem, which meant that causes of maternal deaths could not be confirmed.

In conclusion, a busy tertiary maternity centre premised on evidence-based protocol management of patients and offering free services had a sustained reduction in facility-based MMR of 70% over 5 years. It is, therefore, recommended that the model be adopted in all public maternity centres.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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