



Maternal Deaths in a Tertiary Health Institution in Southeast Nigeria: Two Decades after Safe Motherhood Initiative

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Authors' contributions

This work was carried out in collaboration between all authors. Author LCI designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors HUE, ECA and TCO managed the analyses of the study. Authors JCU, CCTE and UIE managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Background: Decades after several concerted efforts were made to contain the scourge, maternal deaths continue to have a devastating effect in many developing countries. Strengthening the strategies to reduce these calamitous losses is necessary to achieve a palpable decline in the commonly affected regions.

Aim: This study was undertaken to determine the Maternal Mortality Rate (MMR) in Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Awka, Southeast Nigeria and to compare with rates in other similar institutions.

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Methods: A retrospective analysis of all maternal deaths over a five year period, January 2012 to December 2016. Data analysis was by means of descriptive and inferential statistics including means, frequencies and χ^2 -tests at the 95% confidence level (CL).

Results: During the 5 year period (2012-2016), there were a total of 5057 live births and 13 maternal deaths. The overall MMR was 257 per 100,000 live births.

Maternal Mortality (MM) was highest amongst women age 40 years and above, 1429/100,000 live births ($P=0.047$).

Leading contributors to maternal deaths were grandmultiparity (33.3%) and unbooked mothers (75%). Mothers living in the rural area, unbooked and of lower socio-economic status were 4.7, 7.8 and 5.7 times more likely to be associated with maternal death.

Major direct causes of maternal deaths were sepsis (33.4%), haemorrhage (22.2%) and ectopic pregnancy (22.2%). HIV/AIDS (100%) was the major indirect cause of maternal deaths.

MMR increased gradually at the study hospital from zero in 2012 to the highest level, 588/100,000 live births in 2016.

Conclusion: MMR, though gradually increasing in COOUTH is still lower than the national average and outcome in similar health institutions in Nigeria.

The contributions of HIV/AIDS, unbooked mothers and low socio-economic status to maternal deaths stress the need for increased counselling and testing for HIV/AIDS, antenatal care services and empowerment of women respectively.

Keywords: Antenatal care; grandmultiparity; maternal mortality rate; obstetric care; unbooked; socio-economic status.

1. INTRODUCTION

Maternal deaths are still of calamitous proportions particularly in sub-Saharan Africa (SSA) where half (50.4%) of all maternal deaths worldwide occur [1]. In 2005, the maternal mortality rate (MMR) in SSA, estimated at 900 maternal deaths per 100,000 live births was by far the highest in the world [2]. In stark contrast, MMR in industrialized countries is 14 [2].

Nigeria's MMR, ranked as one of the highest in the world stands at 948 maternal deaths per 100,000 live births (range 339 to 1716 per 100,000) [3]. With only 2% of the World's population, Nigeria unenviably accounts for 10% of the world's deaths [4].

Most western countries had broadly similar trends in maternal mortality rates between 250 and 650 per 100,000 live births up to about 1935, followed by a steep decline [5]. Presently the rates in the developed world are between one-fortieth and one-fiftieth of the rates that prevailed over three decades ago [5]. The decline probably reflected in the main, sensible policies, improved standards and uptake of maternity care as well as therapeutic advances and better training in obstetrics and anaesthesia [5].

Although there was significant progress in all developing regions, the average annual percentage decline in the global MMR was 2.5%,

short of the Millennium Development Goal (MDG) of 5.5% [2]. The estimated 1.7% annual rate of decline in SSA, where levels of mortality are highest, is slower than in any other region [2].

Causes of maternal deaths include obstetric haemorrhage, prolonged or obstructed labour, hypertensive disorders of pregnancy, especially eclampsia and complications of unsafe abortion [6]. These complications occur without warning at any time during pregnancy and childbirth hence the need to adopt a more proactive strategy in a bid to reduce the agony of maternal deaths.

Most maternal deaths can be avoided if deliveries are conducted by skilled health personnel – doctors, nurses and midwives – who are well equipped and can refer women in a timely manner to emergency obstetric services when confronted with complications [6,7].

In Nigeria, especially in inaccessible rural communities where approximately 75% of the population live, there are few or no emergency obstetric services [8], and the odds are heavy against women who develop obstetric complications in these remote areas. Apart from paucity of these centres for emergency care, utilization of the available ones are encumbered by delays in decision taking at home, poor logistics and inadequate staffing and equipment [8]. By emergency obstetric care, it should be possible for women who develop complications

to have access to facility where staff can complete an incomplete abortion, administer a blood transfusion, provide antibiotics, oxytocics and anticonvulsants and provide emergency caesarean section [1].

The Safe Motherhood Initiative (SMI) was launched in Kenya in 1987 and had the ambitious target of reducing by 50% the world's maternal deaths by the year 2000 [9]. There is need for regular assessment of efforts aimed at reducing maternal mortality.

Chukwuemeka Odumegwu Ojukwu University Teaching Hospital (COOUTH) is located in southeastern Nigeria and serves an estimated population of 4 million. It was a General Hospital (secondary health centre) which was transformed to a tertiary Hospital in 2012.

Since conversion to a tertiary health centre, no audit of maternal deaths had been carried out. This study was undertaken to determine the MMR and to compare with the rates in other similar health institutions.

2. MATERIALS AND METHODS

This was a retrospective analysis of maternal deaths at Chukwuemeka Odumegwu Ojukwu University Teaching Hospital (COOUTH), Awka (formerly Anambra State University Teaching Hospital), South East Nigeria over a five year period from January 2012 to December 2016.

The Hospital is centrally located and serves as a referral centre for several private and public health institutions. The Hospital offers blood transfusion services and stocks are replenished from the National Blood Transfusion Services. All booked antenatal mothers are also required to arrange for one unit of blood to be deposited in the hospital's blood bank. Women in need of blood transfusion, especially in times of emergency are assisted promptly from this pool. The Hospital adopted the policy of commencing treatment on patients unable to pay in times of emergency once this was indicated on the patients' folder.

Approval for this study was obtained from the Ethics and Research Committee of COOUTH.

In this study, a maternal death was defined as death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of

the site or duration of pregnancy, from any cause related to, or aggravated by the pregnancy or its management, but not from accidental or incidental causes [10].

Maternal deaths were identified from the Labour ward, Obstetric ward, Obstetric theatre, Intensive Care Unit (ICU) and Accident and Emergency records. The case notes were retrieved from the Hospital's Medical Records Library. Cases of missing folders were excluded from the study. Similarly, maternal deaths before arrival at the Hospital and deaths from accidental or incidental causes were excluded.

Information on age, booking status, parity, gravidity, socio-economic class, place of residence, ethnic group and causes of death were obtained from the case notes by two research assistants using pre-established and piloted data extraction forms. The social classes of the women were determined using Olusanya's classification which makes use of the educational status of the woman and her husband's occupation [11]. The scores are graded thus for the purpose of this study; 1-2 is graded as high, 3 as middle and 4-5 as low social class. Place of residence was described as rural if it falls outside the 10-kilometres radius mark from the city centre as established by the Town Planning Authority. Unbooked refers to mothers who neither registered nor attended antenatal care.

Causes of maternal death were discussed during the departmental maternal mortality review meetings. No post-mortem was done because the relatives objected to the procedure. For patients with multiple causes of death, the primary obstetric cause was chosen based on clinical information and diagnosis.

2.1 Data Analysis

The data was analysed using SPSS version 17 (Chicago IL, USA). Chi square test was used to examine the significant association between variables. Odds ratio at 95% confidence interval was generated to quantify the degree of association between variables. Logistic regression model was used to determine variables associated with maternal deaths while controlling for confounding variables. Statistical significance was set at level ≤ 0.05 . The results were presented in tables, bar charts and simple percentages.

3. RESULTS

During the 5 year study period, there were a total of 5057 live births and 13 maternal deaths. The overall MMR was 257 per 100,000 live births.

Twelve (91.7%) case notes were available for further analysis.

All women were married and 10 (88.3%) were of Igbo ethnic group. The Hausas made up the rest (16.7%). The mean age of the women was 23±17 years (range 15 to 42 years).

Table 1 shows the socio-demographic/ clinical characteristics and MMRs.

MMR was highest among women aged 40 years and above, 149/100,000 live births ($P=0.047$) and grand multipara (5 or more viable pregnancies), 377/100,000 live births ($P=0.019$).

Similarly unbooked mothers 9 (75%) and women of low socio-economic status were significant contributors to maternal deaths, $P=0.205$ and $P=0.037$ respectively.

Although women residing in the rural area had more deaths, 7 (58.3%) compared to their urban counterparts, 5 (41.7%) this did not reach statistical significance ($P=0.612$).

In multivariate analysis, place of residence, booking status and socio-economic status were significant determinants of maternal deaths [OR 4.7; 95% CI (1.04-26.16)], [OR 7.8; 95% CI (1.45-30.61)] and [OR 5.7; 95% CI (1.09-29.18)] respectively.

Fig. 1 shows the yearly trends in MMR.

MMR in the study hospital showed a gradual increase from zero in 2012 to 105/100,000 live births in 2014. This was followed by a sharp increase in 2015 (393/100,000 live births) and the highest ratio of 588/100,000 live births in 2016.

Table 2 shows the causes of maternal deaths. Major direct causes of maternal deaths were sepsis 3(33.4%), haemorrhage 2(22.2%) and ectopic pregnancy 2(22.2%). HIV/AIDS (100%) was the major indirect cause of maternal deaths.

Table 1. Socio-demographic/Clinical characteristics

Age(Years)	Maternal deaths N=12 No(%)	Live births N=5057	Maternal mortality rate (MMR)/100,000 live births	Statistics
-20	3(25)	1017	295	
20-29	2(16.7)	2027	99	
30-39	3(25)	1733	173	
≥40	4(33.3)	280	1429	$P=0.047$
Parity	No(%)			
0	4(33.3)	1346	297	
1	2(16.7)	1521	131	
2-4	2(16.7)	1132	177	
≥5	4(33.3)	1060	377	$P=0.019$
Socio-economic class	No(%)			
Low	7(58.3)	1906	326	
Middle	4(33.4)	2054	195	
High	1(8.3)	1097	91	$P=0.037$
Place of residence	No(%)			
Rural	7(58.3)	4071	172	
Urban	5(41.7)	986	507	$P=0.612$
Booking Status	No(%)			
Booked	3(25)	4430	68	
Unbooked	9(75)	627	1435	$P=0.205$

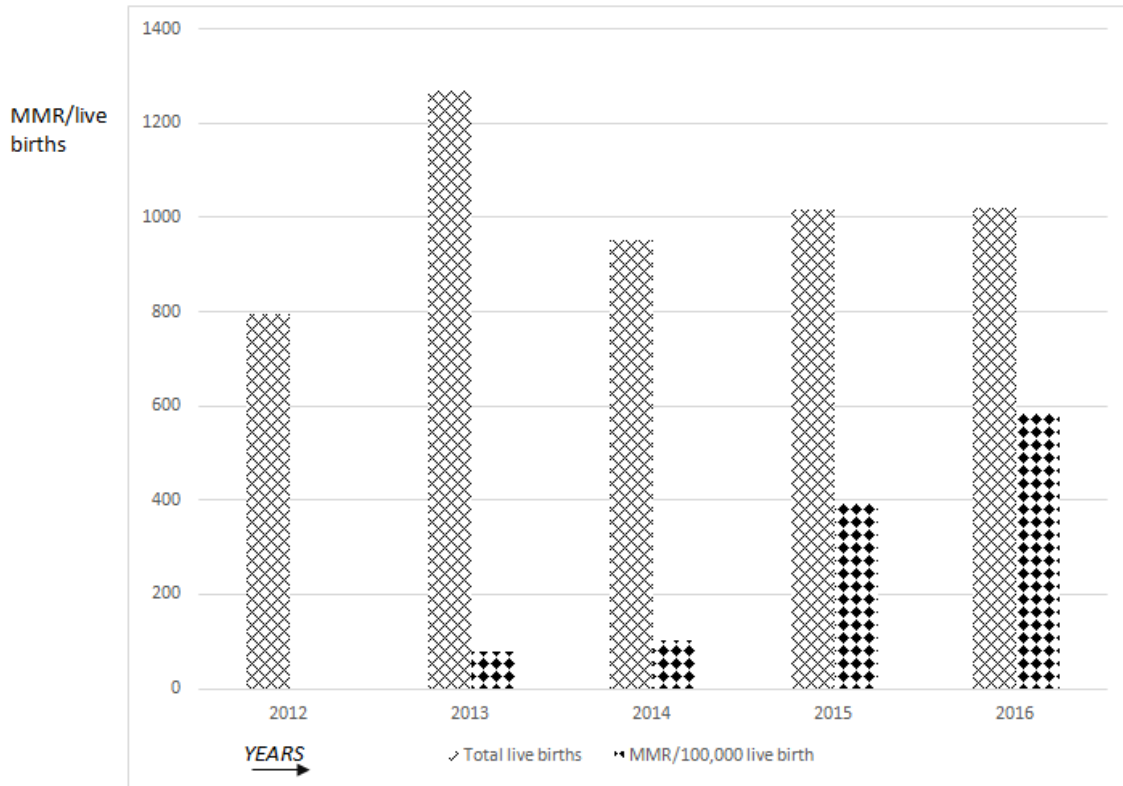


Fig. 1. Yearly trends in maternal mortality rates/Live births

Table 2. Clinical causes of maternal deaths

Indirect	No (%)
HIV/AIDS	3(100)
Direct	
Sepsis	3(33.4)
Haemorrhage	2(22.2)
Ectopic Pregnancy	2(22.2)
Disseminated Intravascular Coagulation	1(11.1)
Pulmonary Embolism	1(11.1)
Total	9(100)

4. DISCUSSION

The MMR, 257/100,000 live births recorded in this study was lower when compared with rates from similar institutions in Nigeria: Benin 2,282/100,000, Jos 1,260/100,000 and Lagos 2,096/100,000 [7,12,13].

The value obtained in this study was also lower than the estimated national average of 545 maternal deaths per 100,000 live births [3]. It was however higher than the 5-10 per 100,000 maternities reported in developed countries [14]. The low MMR in this study could be attributed to

the strict adherence to policies aimed at reducing institutional delays at emergencies that were responsible for significant maternal deaths in Benin City, Nigeria [7]. These include availability and easy access to blood transfusion services and immediate commencement of treatment without recourse to payment. It could also be attributed to the health-seeking behavior of the ethnic Igbos who constitute 88.3% of the population under review. In a study on determinants of use of maternal health services in Nigeria, Babalola et al. [15] observed that compared to women of other ethnic groups, Igbo women were significantly more likely to report use of skilled assistance for delivery.

In this study, 16.7% of the maternal deaths were among the Hausa ethnic group. This could be related to religious/cultural beliefs which restrict women of this ethnic group from readily seeking health-related assistance in pregnancy and childbirth [15]. Wall [16] noted the profound role of “kunya” or “shame” in Hausa childbirth which forbids the girl in labour from seeking assistance thus contributing significantly to maternal morbidity and mortality.

Maternal mortality was high in both extremes of reproductive age. This is in line with other reports [12,17]. This could be attributed to teenage pregnancy and its peculiar outcome. The high maternal mortality among women of 40 years may be due to the age-related medical disorders that are usually common. The grandmultipara, having passed through the feat of childbearing several times often adopt an overconfident and lackadaisical attitude to antenatal care and use of skilled attendants in labour thus contributing significantly to maternal morbidity and mortality [18] as was observed in this study.

MMR was higher in the unbooked than the booked women thus showing the importance of antenatal care. The outcome in this study is similar to other reports [12,17].

MMR among rural dwellers was higher than in urban dwellers. This has been reported by other researchers [18,19]. This could be attributed to logistic difficulties resulting in delays in arriving at the central hospital. This underscores the need to establish more emergency obstetric care centres in the rural areas.

Poverty aggravates every other risk factor for maternal morbidity and mortality [6]. Our study showed higher maternal deaths among the lower socio-economic group. In a similar study in Indonesia, maternal mortality was three or four times higher among women of lower economic status compared to those who are wealthy [20]. The reasons could be multifactorial. In our patriarchal society where finances are limited and traditionally managed by men, women's expenses on health are not often a priority [21]. In addition, under privileged families often live far away from health care facilities and difficulties may include inability to pay for health services as well as transportation.

There were no maternal deaths in the study hospital in 2012. This coincided with the upgrading of the Hospital from a secondary health care facility to a tertiary health care Hospital. This transformation was followed up with recruitment of more obstetricians, nurses and other health workers as well as procurement of modern equipment. The resultant improved obstetric services and minimization of institutional delays probably contributed to the zero MMR observed in this study.

The MMR rose to 79/100,000 live births in 2013 and 105/100,000 live births in 2014. Both values

are however still below the national average of 545/100,000 live births [3]. The rise in MM observed in 2015 and 2016 may be related to the recent global economic recession which put close to 60% of Nigerians in extreme poverty resulting in inability to pay for medical expenses and consequent decline in hospital births [22].

HIV/AIDS was the major indirect cause of maternal mortality in this study. The emergence of HIV/AIDS as a leading cause of maternal deaths in many resource-poor settings has been reported [7,12]. In Benin City, Nigeria, one in every four maternal deaths occurred in women with HIV infection [23]. Common causes of HIV/AIDS-related maternal deaths include opportunistic infections such as pneumonia, tuberculosis and severe malaria [12]. COOUTH was designated as referral center for the management of HIV/AIDS in 2007 and this may account for the high contribution of HIV/AIDS to maternal deaths in this study. This calls for a scale up of counselling and testing for HIV/AIDS as well as provision of prevention of mother-to-child (PMTCT) services for all pregnant mothers to reduce the scourge of HIV/AIDS infection.

The direct causes of maternal deaths in this study were sepsis, haemorrhage, ectopic pregnancy and pulmonary embolism. This is in agreement with other reports [7,12]. The contribution of sepsis in this study, 33.4% could be related to the HIV/AIDS and the unbooked mothers.

Eclampsia, which was a leading cause of maternal deaths in Maiduguri, Nigeria, 46.4% was rare in this study [19]. Ectopic pregnancy was responsible for 22.2% of the maternal deaths. In other studies in Nigeria, ectopic pregnancy contributed 1.8% to 4.6% of the maternal deaths [17,19]. This calls for a high index of suspicion among medical workers as the diagnosis of this morbidity could be easily missed by the unwary.

Pulmonary embolism contributed 11.1% of the maternal deaths. This was higher than 5.4% reported in Jos, Nigeria [12].

Obstetric haemorrhage, a major cause of maternal death was seen in 22.2% of the mothers with antepartum (APH) and postpartum (PPH) haemorrhage contributing equally, 11.1%. The report from this study was comparable to 7.9%-23.1% from other studies in Nigeria [12, 19]. It was however lower than the study carried

out in Sukkur, Pakistan which showed haemorrhage to cause 60% of maternal deaths [24].

A major limitation of this study was the absence of postmortem examination to confirm clinical impressions due to non-acceptance of the procedure in the area of study. Furthermore, the study was retrospective and institution-based and may not be a true reflection of the magnitude of maternal deaths in the community. A community-based prospective survey is necessary.

5. CONCLUSION

In conclusion, this study showed that though there was a gradual increase in MMR, the rate is still low when compared with the national average and outcome in similar health institutions. There is therefore the need to reinforce institutional policies which minimize delays in providing obstetric care especially at emergency. The monumental contributions of HIV/AIDS to maternal deaths call for increase in testing and counselling centres as well as PMTCT services for pregnant mothers.

The contributions of unbooked patients and low socio-economic status to maternal deaths in this study validate the calls for intensive advocacy on the importance of antenatal care and the need to empower women who incur substantial expenses to obtain required medical services.

CONSENT

All authors declare that "written informed consent was obtained from the next of kin of all the deceased for publication of this paper".

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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