

A continuing tragedy of maternal mortality in a rural referral center in Northeast Nigeria: A wake-up call

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ABSTRACT

Context: While reasonable progress has been made worldwide in reducing maternal mortality at the end of the millennium development goal, the same cannot be said of underserved rural communities where the tragedy continuous unabated.

Aim: To determine the maternal mortality ratio, causes, and some socioeconomic determinants of maternal deaths in the last triennium of the Millennium Development Goal (MDG) in a rural tertiary center in Northeast Nigeria.

Materials and Methods: Retrospective descriptive study of maternal mortality at the Federal Medical center (FMC) Nguru, Northeast Nigeria from January 1st 2013 to December 31st 2015. The center attends largely to underserved rural populace. Results were presented in simple percentages and means with a *P* value <0.05 considered as significant.

Results: The maternal mortality ratio for the triennium was 7,364/100,000 live births with 2015 having the highest MMR of 8,517/100,000. Majority of the deaths occurred in unbooked (*n* = 87; 46.5%) women with no formal education (*n* = 120; 64.2%). A third of the maternal deaths occurred in women at the peak of their reproductive age of 25 to 34 years (*n* = 69; 36.9%). Grandmultiparity is a major risk factor for maternal deaths (43.9%; *P* = 0.02) compared to nulliparous women (31.5%; *P* = 0.08). Eclampsia (*n* = 64; 34.2%), Obstetrics hemorrhages (*n* = 22; 11.8%) and sepsis (*n* = 18; 9.6%) still remain the most common direct causes of maternal deaths while anemia was responsible for nearly 60% of the indirect causes. Significant number (36%) of these women reside in communities with secondary or tertiary health care facilities. Majority (39.5%) presented to a health care facility more than 24 hours from the onset of obstetric incidence with 52% of them dying within 24 hours of presenting to the FMC. Interestingly, 82% of the deaths from Nguru local government area are in those who reside within 5 kilometers of the FMC.


Conclusion: This region has consistently maintained high MMR but this ratio of 7,364/100,000 live births is the highest so far. The causes of maternal deaths are still the same as they were 2 decades ago. The question still remains unanswered: why are many women not seeking healthcare services even when it is as close as 5 km from their residence? Why do women present with obstetric emergencies when over 70% of them reside where there are health care facilities? We recommend further research to answer these questions and to guide policies and programs that will lead to the achievement of sustainable development goal 3.1 by the year 2030.

Key words: Last triennium; maternal death; maternal mortality ratio; rural referral center.

Introduction

The millennium development goal (MDG) 5a which aimed at achieving reduction in maternal mortality by 75% by the end of 2015 turned out to be a mirage for most developing

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countries. Based on the annualized rates of change from 1990 to 2011, only few countries, mostly in the developed nations, achieved the 75% target in reduction of maternal mortality while almost all the African sub-region may likely arrive at this target well past the year 2040.^[1] The final MDG report of 2015 showed a global decline in maternal mortality ratio (MMR) of 45% from 380/100,000 live births in 1990 to 210/100,000 live birth in 2013.^[2] However, there is a wide regional variation in the decline. While Australasia and Western Europe maintained their low MMR of less than 30/100,000 live births throughout the 25 years,^[3] the same cannot be said of sub-Saharan Africa, which despite recording 49% decline in MMR, 800 women are dying each day from pregnancy and child birth related complications. The region alone accounted for 86% of maternal mortality globally in 2013.^[2] In 2015, when much decline was expected, the region accounted for 99% of the global maternal mortality with Nigeria carrying the highest burden of 19% (580000 deaths).^[4] This major discrepancy is a measure of the standard of healthcare system in sub-Saharan Africa.^[5]

Despite policies and programs to reduce maternal deaths in Nigeria,^[6,7] the Nigerian Demography and Health Survey (NDHS) of 2013 is not significantly different from the ratio reported in the 2008 NDHS. Interestingly an increase in MMR from 545 per 100,000 live births in 2008 to 576 per 100,000 live births in 2013 was recorded.^[8] The life-time risk of maternal death in Nigeria is 1 in 30 women compared to their counterparts in the United Kingdom where a man is more likely to die than his pregnant partner.^[8,9] Several factors have been attributed to the high maternal mortality in Nigeria. Most reports point to poor access to healthcare facility, poverty, ignorance, substandard healthcare services, and inadequate political will as the major contributing factors to the high maternal mortality.^[10-12]

The Northeast geopolitical zone of Nigeria has the worst human development index in the country. The poverty level in the region is higher in the rural areas than in the urban centers. This partly contributes to the high maternal mortality in the region.^[13] MMR of 636/100,000 live births has been reported from Yola; 1074/100,000 from Maiduguri; and 1,732/100,000 from Bauchi.^[14-16] A MMR of 2,849/100,000 has been reported from Nguru with an annual trend as high as 6,234/100,000 in 2003 alone.^[17] Gombe has equally reported case-specific maternal mortalities as high as 7,605/100,000 from obstructed labor.^[18]

Most reports on maternal mortality were from urban referral centers. Federal Medical center Nguru is located in a rural area of the North-East where reports of MMR are at their

worst. We, therefore, report the magnitude of MMR in this region at the end of the set target for achieving MDG 5a. We focused on the causes and possible factors that might have contributed to the failure to achieve the 75% reduction. Our findings may guide policies geared towards reducing maternal mortalities and contribute to the actualization of sustainable development goal (SDG) 3.1 by 2030.

Materials and Methods

This is a retrospective hospital-based review of maternal mortality which determined the maternal mortality ratio, trend, causes, and factors contributing to maternal mortality in this region at the end of the MDG 5a target dateline.

Federal Medical Center Nguru is the only Federal tertiary health center in Yobe State, Nigeria and the only Hospital providing specialist health service in about 200 km radius in that region. It equally attends to large number of patients from the neighboring Jigawa State and border towns of republic of Niger.

Records of maternal deaths at the center from January 1st 2013 to December 31st 2015 were retrieved from the medical records department, Labour, Obstetrics and Gynaecology wards admission registers, the hospital operating theater, and the emergency unit registers. Of the 209 maternal deaths recorded in the period under review, 187 case files were retrieved given a retrieval rate of 89.5% which is the bases for further analysis. Maternal mortality was defined according to international Statistics Classification of Disease 10 (ICD –MM).^[19] We excluded coincidental maternal deaths and late Maternal Deaths. Where there are more than one diagnosis for the maternal death, the most likely/primary cause of death was used.

Data were recorded on a proforma designed for the study. They included demographic data, booking status, availability, and utilization of health care facility in the patient's home town before presentation and time spent at home before accessing any level of care. Information obtained were coded and entered into an IBM-compatible PC. Data were analyzed using IBM SPSS statistics version 20.0 (Armonk, NY: IBM Corp.). Results are presented in simple percentages and means with a *P* value <0.05 considered as significant. The study was approved by the Institutional Research Ethical committee.

Results

Trends in maternal mortality

Triennial report for the period 1st January 2013 to 31st December, 2015 showed maternal mortality ratio (MMR)

of 7,364/100,000 live births with 2015 having the highest MMR of 8,517/100,000. There was concomitant high fetal losses with still birth rate of 215/1,000 live births and low hospital deliveries with a total live births of 2838 in the triennium. This trend is illustrated in Table 1.

Demography

Majority of the deaths occurred in unbooked ($n = 87$; 46.5%) and referred ($n = 75$; 40.1%) women with no formal education ($n = 120$; 64.2%). The age range was 17 to 45 years with a mean (SD) age of 25.22 ± 6.52 years. A third of the maternal deaths occurred in women at the peak of their reproductive age of 25 to 34 years ($n = 69$; 36.9%). Adolescent mothers equally contributed significantly to the maternal mortalities ($n = 41$; 22%). Grand multiparity is a major risk factor for maternal deaths accounting for 85 (43.9%) of the deaths compared to 59 (31.5%) of nulliparous women. Most of the gestations were at term ($n = 114$; 61%) with only 3% ($n = 6$) mortalities in pre-viable gestation before 28 weeks. Table 2 showed some demographics of the patients.

Causes

Direct obstetric complications were responsible for 140 (74.8%) of the maternal mortality with the triad of pre-eclampsia/eclampsia ($n = 64$; 34.2%), obstetric hemorrhages ($n = 22$; 11.8%), and sepsis ($n = 18$; 9.6%) accounting for over 50% of the maternal deaths. Case fatality rate for eclampsia was 19.7% out of 325 eclampsia recorded during the period and eclampsia-related MMR was 2,255/100,000 live births. Of the 25.2% contributed by indirect causes (47/187), anemia and its complications was responsible for nearly 60% of the indirect causes of maternal deaths. Other causes of maternal mortalities in this center are illustrated in Table 3.

Proximity to a health care facility in place of residence

Analysis of those whose residential address were available showed that a quarter of this women are from Nguru local Government area (LGA), of which 82% reside within 5 kilometers to the tertiary health care center while another 22% came from Bade LGA, 65% of them from Gashua the headquarters of Bade LGA which is 75 km from Nguru and has one of the largest secondary health facility (a general hospital) in the region.

Availability of health care facility in place of residence

With regards to availability or otherwise of health care facility in the towns/villages of residence, 79.4% had health care facilities available while 21.6% came from places with no health care facility of any kind. Majority (43.5%) had primary health care (PHC) centers only, 19.6% reside in areas with a General Hospital (GH) in addition to PHCs and 16.3% came from areas with tertiary health center. We do not have data on accessibility of some of these health care facilities.

Table 1: Triennial trends in birth and maternal deaths

Year	Total births	Live births	Still births	Maternal deaths	Maternal mortality ratio
2013	1172	891	281	74	8,305/100,000
2014	1180	949	231	50	5,269/100,000
2015	1284	998	286	85	8,517/100,000
Total	3636	2838	778	209	7,364/100,000

Table 2: Sociodemographic characteristics

Variables	Number	Percentage
Age (years)		
≤19	41	22
20-24	52	27.8
25-29	41	21.9
30-34	28	15.0
≥35	25	13.3
Total	187	100
Age range: 17 to 45 years	Mean age (SD)	25.22 (±6.52)
Parity		
0	59	31.5
1-4	46	24.6
≥5	82	43.9
Total	187	100.00
Parity range: 0-14	Mean parity (SD)	3.12 (3.3)
Educational status		
None	120	64.2
Primary	28	15.0
Secondary	8	4.3
Tertiary	0	0.0
Others (Quranic etc.)	31	16.5
Total	187	100.00
Booking status		
Booked	25	13.4
Unbooked	87	46.5
Referred	75	40.1
Total	187	100.00
Gestational age at time of death		
Pre-viable age	6	3
Preterm	26	14
Term	114	61
Unsure of date/missing data	41	22
Total	187	100.0

Utilization of the health care facility

Reviewing their utilization of health facilities showed that only 13.4% had antenatal care, 40.1% were referred to these centers with obstetric emergencies while 46.5% of the women that died never attended any health care facility prior to presentation at the Federal Medical Center.

Time interval from onset of complication to presentation at a health facility

Majority (39.5%) presented to a health care facility more than 24 hours from onset of obstetrics incidence. Only 22% presented in less than 12 hours, 21.4% presented within 12

Table 3: Causes of 187 maternal death in the triennium

Causes	Number	Percentage
Direct causes		
Pre-eclampsia/Eclampsia	64	34.2
Obstetric hemorrhages	22	11.8
Sepsis	18	9.6
Obstructed Labor	16	8.5
Ruptured uterus	14	7.5
Ectopic pregnancy	2	1.1
Abortion	2	1.1
Hyperemesis gravidarum	1	0.5
Trophoblastic disease	1	0.5
Indirect causes		
Anemia in pregnancy	28	15.0
Peripartum cardiac failure	5	2.7
Malaria in pregnancy	3	1.6
Viral Hepatitis	2	1.1
HIV/AIDS	2	1.1
Tuberculosis	2	1.1
Typhoid perforation	1	0.5
Anesthetic death	1	0.5
Hypocalcemic tetany	1	0.5
Not specified	2	1.1
Total	187	100

to 24 hours, while 11.9% had intrapartum events at the health facility and 5.2% had no information on the time of onset of obstetric incidence.

Admission to death interval

Duration of hospital admission to death varies from barely an hour to 17 days. Fifty two percent ($n = 97$) of the mortalities occurred within 24 hours of admission; 32.6% of which were within 1 to 12 hours. Only 23.5% ($n = 44$) stayed for more than 72 hours on admission while the remaining 24.5% ($n = 46$) were admitted for 24 to 72 hours before death.

Discussion

From our literature search, an MMR of 7,364/100,000 live births with an annual ratio as high as 8,517/100,000 live births has never been reported making this report likely the highest in the world. Even though the mortality in this region is known to be high, the findings are outrageously too high considering the MDG expectations for 75% MMR reduction by the end of 2015. Our finding is 35 times higher than the global record, 14, 7, and 2.6 times higher than the Nigerian national, the northeast regional, and local records, respectively.^[2,8,14,17] The report paradoxically showed increasing trend with the highest MMR of 8,517/100,000 live births recorded at the end of the set target of 75% reduction. The 28% drop (5,269/100,000 live birth) recorded in 2014 was not a true representation of the rate for the period as there was industrial strike in the health sector during which

the hospital was closed for about 3 months. The over 250% increase from the 2009 report from the same center showed an overwhelming increased trend. We equally observed high stillbirth rate of 215/1,000 live births (778 stillbirths in 3 years). These reflect the magnitude of maternal, newborn, and child health care challenges in this predominantly rural community.

This high rate is a reflection of the dichotomy between the gaps in social amenities from education through socioeconomic status between the urban and rural populace. Most reports on maternal mortality are from teaching hospitals in the urban cities. Federal Medical center Nguru attends to underserved rural population. Antenatal attendance is poor and home delivery is the norm in most northern communities.^[8,20] Our findings could be explained by the fact that this is the only referral tertiary health center within 200 km radius where women can access emergency obstetric care, however, it is equally a reflection of the poor policies and programs on reducing maternal mortality in Nigeria, especially in the northeast sub-region.^[10-12] Reversing this trend requires political will and programs to address the root causes.

Poor antenatal care attendance and illiteracy are known contributors to high MMR. This has been corroborated by our study were 87% ($n = 162$) of the maternal deaths occurred among unbooked or those presenting to the hospital for the first time with obstetrics emergency [Unbooked = 87 (46.5%); referred = 75 (40.1%)] giving an MMR of 5,708/100,000 live births for unbooked mothers. Majority of our cases had no formal education ($n = 120$; 64.2%). Although we reported a higher rate, it is consistent with other reports from the region.^[14-16,21] This is equally in agreement with the low literacy level in the region.^[8]

The vulnerable age with the highest MMR in our study were those at the peak of their reproductive age of 25 to 34 years, they constituted a third of the maternal deaths ($n = 69$; 36.9%). The age range was 17 to 45 years with a mean (SD) age of 25.22 ± 6.52 years. Our study did not show much variance among the age groups in contrast to previous studies which states that maternal mortality is high at extremes of reproductive life.^[15,16,21] Our finding of maternal mortality across all reproductive age group has been the trend in this center.^[17] This could be attributed to early marriage and high fertility rate which increases their susceptibility to obstetric complications, a norm in most rural communities in Northern Nigeria. Although adolescent mothers equally contributed significantly to maternal mortalities in this center ($n = 41$; 22%) with a MMR of 1,445/100,000 live births, this is low when compared to reports from Northwest Nigeria.^[22]

Parity is a significant contributor to maternal mortality in our study with $\chi^2 = 16.34$; $P = 0.003$. Grandmultiparity is a major risk factor for maternal deaths in this center, accounting for 43.9% of the deaths ($n = 85$; $P = 0.02$) compared to 31.5% ($P = 0.08$) of nulliparous women. This is in agreement with reports from Maiduguri.^[15,21] This is not surprising considering the high fertility rate with its attendant complications in the region.

Direct obstetric causes are still responsible for majority of the maternal deaths in this study ($n = 140$; 74.8%), while the indirect causes accounted for 25.2% ($n = 47$). Poor utilization of antenatal care services could be a contributory factor to this unacceptable high prevalence in addition to poor commitment on the part of policy makers. In contrast to findings in developed world where majority of maternal deaths are from nonavoidable conditions such as demographic factors such as cardiovascular diseases and older maternal age,^[23] our study still showed pre-eclampsia/eclampsia to be the leading cause of maternal mortality, a condition which has been the leading cause of maternal mortality for over two decades in this region.^[14-17,21,24,25-27] Of the 325 eclamptic cases managed during the period, there were 64 mortalities from eclampsia giving a case fatality of 19.7%. While less than 1 death occurred from pre-eclampsia/eclampsia for every 1 million women given birth in the UK,^[23] the same cannot be said for this center and other part of northeast Nigeria. There has been a decrease in case fatality for eclampsia from 22.33% earlier reported from this center^[28] to 19.7% in this study. This could be attributed to improvement in the management of eclampsia in the center. The triad of pre-eclampsia/eclampsia ($n = 64$; 34.2%), obstetric hemorrhages ($n = 22$; 11.8%), and sepsis ($n = 18$; 9.6%) accounted for over 50% of the maternal deaths. This is in agreement with report from Nnewi, southeast Nigeria.^[29] Obstetrics hemorrhages and sepsis which account for 11.8% and 9.6% in this study is higher than the 9.1% and 7.5% reported from Maiduguri recently.^[15] These are avoidable conditions which no longer top the list of causes of maternal mortality in developed Nations but the top three leading causes of maternal deaths in Nigeria, as corroborated by reports from other studies in Nigeria.^[14,15,27] In consonance with an earlier report from the region, abortion is not a common contributor to maternal mortality.^[17] It is equally the least in this study (1.1%) with probably the same reason for the low rate as earlier reported. The 2 cases in our review were due to spontaneous abortion all of whom presented late with sepsis and anemia, respectively.

Of the 25.2% contributed by indirect causes, anemia and its complications was responsible for 15% of the maternal deaths and nearly 60% of the indirect causes of maternal

deaths in this review. This is in contrast to findings from urban centers where HIV has been showing an increasing trend as the leading cause of indirect medical causes of maternal mortality.^[14,15,21] Compared to 1.1% in our study, HIV/AIDS is as high as 17.8% in Maiduguri, an urban center in the same geopolitical zone. The high rate of anemia could be attributed to the poor utilization of ANC services, poor nutritional status, infections, and infestations in addition to increased demand from repeated pregnancies in these agrarian rural communities.

We reviewed some socioeconomic determinants of maternal mortality in the center in line with Thaddeus's^[30] context of the three important contributory factors to maternal mortality. A quarter of this maternal mortality occurred in women residing in Nguru local Government area (LGA) of which 82% reside within 5 kilometers of the tertiary health care center. Another 22% came from Bade LGA, of which 65% of them reside within Gashua the headquarters of Bade LGA which is 75 km from Nguru with poor road network. Gashua town has the second largest General Hospital in the State. Majority (79.4%) of these mortalities occurred in women who reside in places with health care facilities, 36% of which are secondary or tertiary health care centers with 24 hours qualified health workers including doctors. However, only 13.4% had antenatal care in these facilities, 40.1% presented to these centers only after onset of obstetrics emergencies while 46.5% of those women who died never attended any of the health care facilities prior to presentation to our center.

Majority (39.5%) of these women presented to a health care facility more than 24 hours from the onset of the obstetric incidence, with only 22% presenting in less than 12 hours. Type 3 delay occurred in 11.9% of these mortalities with nonavailability of blood for transfusion and delay in getting consent from patient's relations for surgical intervention as a major cause.

Thaddeus observed the interplay between distance, cost and quality of care as a major obstacle in the decision to seek care in addition to variables such as gender and socioeconomic state. Probably, there are deep rooted cultures, customs and traditions in addition to socioeconomic status rather than quality of care that stand out most as major contributor to delay in seeking care in these rural communities. This is supported by Galadanci's^[31] report from rural Northern Nigeria where poor health system, low utilization of skilled antenatal care and preference to home deliveries is the norm. It is not surprising that majority (52%) of the mortalities in this review occurred within 24 hours of admission due to late presentation for above reasons rather than quality of care.

The strength of this study is in its rural nature where deep rooted culture, customs, and traditions stand out in most decisions in life compared to most reports on MMR from urban referral centers.

The weakness of this review is in the fact that it is a retrospective study. The federal medical center is the only tertiary center attending to obstetric emergencies in approximately 200 km radius in the region. The low hospital delivery rate equally reduces our denominator for the maternal mortality thereby exaggerating the rate. However, this rate may be higher as those who delivered and died at home are never reported.

Conclusion

In conclusion, this region has consistently maintained high MMR, but this ratio of 7,364/100,000 live births is the highest so far. The causes of maternal deaths are still the same as it were 2 decades ago. The question still remains unanswered: why are many women not seeking healthcare services even when it is as close as 5 km from their residence? Why do women present with obstetric emergencies when over 70% of them reside where there are health care facilities? Could it be due to cultural, traditional or socioeconomic factors? We recommend further research to find answers to these questions and to guide policies and programs that will lead to achieving sustainable development goal 3.1 by the year 2030.

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Conflicts of interest

There are no conflicts of interest.

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