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A retrospective study of maternal mortality rate in Warji local government area of Bauchi state, Nigeria

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Abstract
A five year retrospective study was carried out to investigate the maternal mortality rate (MMR) in some public health centers in Warji LGA of Bauchi State, Nigeria. A total of 17,323 women who registered for and received ante-natal care at the health centers in the area from 1st January 2009 to 31st December 2013 was the sample population size. The data were retrieved from yearly summary report on live birth deliveries, ante-natal care registration, still births, maternal deaths and employment records of Warji LGA. However specific case records of the mothers who died within the period were retrieved from the data base of General Hospital, Warji and were assumed to approximate for the total number of deaths in all health facilities in Warji LGA. Data analyses showed a general reduction in MMR from 932 per 100,000 live births in 2009 to 604 per 100,000 live birth in 2013 (a reduction of 328 per 100,000). This reduction correlates with an increase in antenatal care (ANC) registration of 3065 in 2005 to 3778 in 2009. There has been an increase in proportion of delivery in health facilities from 59% in 2005 to 64.6% in 2009 corresponding to reduction from 836 per 100,000 live births to 604 per 100,000 live births. The number of skilled staff employed increased by 36.4% since 2005 and correlated to MMR reduction of 328 per 100,000 live births since that period. The key obstetric cause of death over the period was haemorrhagc (44%), followed by infection (24%), eclampsia (12%) and obstructed labour (8%). Anaemia, rupture uterus and others had 4% respectively. The causes of maternal death seemed to be affected by age and parity. Generally, reduction in MMR tends to correlate with increasing ANC registration and number of employed staff. Efforts should be made to sustain or increase antenatal services and staff capacity development within the local government.

Keywords: Maternal mortality, Birth rate, Death rate, Population size, eclampsia

Introduction

The arrival of a baby brings joy to the family, but child bearing process is always a risk to the mother. This is why adequate care should be given to the mother and the fetus in order to reduce maternal mortality and morbidity. WHO defined maternal mortality as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy or its management but not from accidental or incidental causes [1]. It was estimated that close 10 million women suffer complications associated with pregnancy or childbirth with about 536,000 of the women losing their lives from pregnancy-related causes annually [2]. Every minute of each passing day, somewhere in the world and most often in the developing countries, a woman dies of complications related to childbirth [3].

The main causes for mortality are haemorrhage, eclampsia, maternal infections, toxaemia, sepsis, obstructed labour, unsafe abortion, malaria, anaemia hepatitis, acute renal failure and insufficient skilled practitioners that can offer antenatal, intra-partum and post natal care services and also unavailability Partographs to be used in recognising and dealing with slow progress of labour before it becomes obstructed, and if necessary, to ensure caesarean section is perform on time to save mother and the baby [4, 5]. In their study, [6] reported that maternal death were directly caused by haemorrhage which accounts for 25%, infection (15%), unsafe abortion (13%), eclampsia (12%) and obstructed labour and other direct causes (16%), while indirect causes accounted for the remaining 20%. Another factor identified as contributory is associated with the delays in recognizing the problem, in decision making, in reaching the health care facility and in receiving care [3]

In December 2010, the global community committed itself to eight modern development goals; collectively known as Millennium Development Goals (MDGs) to be achieved in 2015. Reducing maternal mortality by three quarters between 1990 and 2015 is a priority aspect of goals [7]. Furthermore in 2001, a stake holders' advocacy initiative, the West African First Ladies Summit, held in Bamako, Mali, was launched to work towards significantly reducing maternal death by 2010 in countries involved [8].

In Bauchi State, the free maternal health care service was introduced in November 2007 which according to Bauchi State Ministry of health (2010) has reduced the state's maternal mortality rate currently to 01 per 100,000 live births as against 456/100,000 live births in 2005 [5]. It was reported that some decades ago very little was known about the problems of pregnancy-related death in Nigeria but today statistics have shown that many women and future leaders are lost to the problem [2, 5].

Curbing maternal mortality has been attended by various problems and challenges such as lack of national political commitment and adequate resource allocation, lack or unclear policies, standards and guidelines concerning service delivery and practice regulation, poor logistics for managing drugs,

supplies and equipment, weak national human development and management policies, strategies and poor functioning health systems, weak or non-existent referral systems and weak involvement in the community [5, 9].

Maternal mortality does not take its toll on the immediate family of the woman alone but it affects the entire nation. When a woman dies, children lose their primary care giver, communities are denied of her paid and unpaid labour and countries forego her contributions to economic and social development. Moreover, a woman's death is more than a personal tragedy; it represents an enormous cost to her nation, community and family. Any social and economic investment that has been made in her life is lost. Her family loses her nurturing and her productivity inside and outside the home. The above picture necessitates that efforts be made at all levels of the society to control this problem. Such efforts must begin with research to quantify the problem from community to international levels.

This study therefore, tries to compare and correlate maternal mortality rates with some of its associated factors from the year 2009 - 2013 in Warji Local Government Area of Bauchi State, Nigeria. The study would assist in designing appropriate intervention measures suitable for the peculiarities in Warji community as well as provide basis for further research both in the community and other parts of the country. Moreover, despite the multiple health care services and programs in Nigeria maternal mortality rate is persistently on the increase. This kind of study could therefore assist in identifying possible factors that might not have been taken into consideration.

Methodology

Study area

It is a correlation retrospective study which reviewed maternal death in Warji LGA between 1st January 2009 to 31st December 2013. The population is estimated to be 124,483 (2009 census projection) with 60,648 males and 63,835 females. The population for this study involved women who had their deliveries in General Hospitals in public health facilities in Warji LGA between 1st January 2009 to 31st December 2013. The sample size was 17,323 women who registered for and received ante- natal care as at government health facilities in the area from 1st January 2009 to 31st December 2013.

Data Collection

The study was based on data retrieved from yearly summary report on live birth deliveries, ante-natal care registration, still births, maternal deaths and employment records of Warji LGA. However specific case records of the mothers who died within the period were retrieved from the data base of General Hospital, Warji and were assumed to approximate for the total number of deaths in all health facilities in Warji LGA. This was based on the reliable report that all complicated cases and those suspected to be at high risk at primary health facilities are usually referred to the General Hospital, Warji. Hence record of death is very rare in such health centers.

Inclusion/Exclusion criteria

The maternal dearth included were only those resulting from pregnancy and child birth within the period. All other maternal mortality not associated with child birth and pregnancies within the period were not included.

Ethical issues

A written permission was sought and obtained from the director of primary health care in Warji local government and the Chief medical director of Warji general hospital. The specific identities of the cases were not included in the study.

Data analysis

The data was analysed using Microsoft excel (2007 version) and statistical package for social science students (SPSS) version 16

Limitation of the Study

The study was entirely based on hospital records available. Information on unreported cases was not sought. There was discrepancy between the number of deaths in the summary reports and the actual number of death records retrieved. However this only affected computation on cause of death.

Results and Discussion

The purpose of the study was to compare and correlate maternal mortality rates with some of its associated factors from 2009 to 2013 in Warji Local Government Area. In pursuance of this, processed information were subjected to interpretation to achieve the aim of the study.

Determination of Maternal Mortality Rate

The analysis of mortality rate data collected shows that number of deaths which is the numerator remains the same (14) from 2007 to 2009. However the number of live births which formed the denominator increased over the period resulting in differences in MMR despite the fact that equal number of deaths occurred (Table 1). The use of the denominator, live birth has been recommended where measurement of obstetric risk as well as service delivery is required. The multiplier 'per 100,000' was chosen instead of 'per 1,000' to enable comparison with other previous local and international studies.

Table 1: Determination of Maternal Mortality Rate (MMR)

Year	No of deaths	No of live births	Mortality rate (per 100,000)
2005	21	2253	932
2006	9	2302	391
2007	14	1675	836
2008	14	2244	624
2009	14	2316	604

Comparison of Ante-natal care (ANC) registration with maternal mortality rate

A comparison and correlation of antenatal care registration with maternal mortality rate between 2009 and 2013 (Table 2) shows that antenatal care registration increased by 573 in 2010 with a corresponding MMR reduction in rate of 541/l00000. In 2011 there was ANC registration decrease of 750 from the 2013 record with a corresponding MMR increase of 445/100000. The year 2012 recorded a marked ANC registration increase of 1066 with a corresponding MMR reduction of 212. Surprisingly the year 2013 recorded an ANC registration reduction by 176 but without any increase of MMR. However the decrease in MMR recorded was small (20/100000) compared to decrease of 212/100000 recorded in 2012. The table generally shows that increase in ANC

registration tend to result in corresponding decrease in MMR, while ANC registration decrease tend to result in either a comparatively small reduction or increased Maternal mortality rate. The marked decrease in 2010 may be associated with a free Health program of Niger Delta Development Commission (NDDC) that year, while that of 2012 may not be unconnected with the introduction of free maternal health program by Bauchi State in 2011. However the unusual increase noted in 2011 seems to suggest the place of skilled attendants. The findings of this study agrees with the work of [10], who reported that antenatal care has great potential in recognizing the mothers and signs of danger in time so that the lethal complications can be avoided. For example, the need for the need for caesarian section can be noticed early enough to make preparations that enable a successful delivery rather than even trying vaginal delivery when it is known to be a risk. Antenatal care also makes it possible to screen for infections especially HIV infection [10, 11]. It was reiterated that antenatal care provides an important entry point for pregnant women to receive a broad range of health promotion and preventive health services, including nutritional support and prevention and treatment of anaemia, prevention, detection and treatment of malaria, tuberculosis and sexually transmitted infections especially HIV [11]. The World Health Organization has recommended at least (4) quality antenatal care visits for women whose pregnancies are progressively normal, with the first visit in the first trimester at 24-28 weeks, 32 weeks and 36 weeks. Comparing the findings of this study therefore with above reports, there is a strong suggestion of a relationship between quality of antenatal care and reduction in maternal mortality.

Table 2: Comparison and correlation of antenatal care registration with maternal mortality rate between 2009 and 2013

Year	2009	2010	2011	2012	2013
ANC registration	3065	3638	2888	3954	3778
MMR (per 100000)	932	391	836	624	604

Comparison and of skilled delivery and Maternal Mortality Rate

Table 3 shows that the proportion of skilled delivery steadily decreased from 74.6% in 2005 to 59% in 2011, and then gradually increased from 59% in 2011 to 64.6% in 2013. The number of deliveries by skilled attendants increased by 10% in 2010 without corresponding increase in MMR. However, a further a decrease, 5.6% in 2011 correlated with MMR increase by 445/l00000. The proportion increased marginally by 0.5% in 2008 correlates with MMR reduction by 2l2/100000. Another increase in the proportion by 5.1% in 2013 correlated with MMR reduction of 20/l00000. With exception to 2009 and 2010 experience, MMR seems to be reducing with increasing proportion of delivery by skilled attendants, even though not proportionately. However, since other unreported deaths were not included the results probably suggest that more of those with 'not at risk' pregnancies were gradually beginning to patronize hospital delivery especially since 2011 probably due to the state's free maternal care. Generally however the result suggests that hospital delivery alone may not have substantial impact on MMR without. This finding is also in agreement with earlier reports that the most important intervention for improving maternal health is the availability of quality medical services pre and post-birth [11, 9]. also stated that skilled attendance during pregnancy, childbirth and postnatal period at all levels of the health care delivery system is a major road map in accelerating the reduction of maternal mortality. She further reiterated that there should be an increase in the number of professionals with midwifery skills especially in poor and rural areas.

Table 3: Comparison and correlation of skilled delivery and Maternal Mortality Rate between 2009 and 2013

Year	MMR (per 100000)	Hospital delivery (Proportion of ANC registration that delivered in health facilities
2009	932	2288(74.6%)
2010	391	2351(64.6%)
2011	836	1703(59%)
2012	624	2353(59.5%)
2013	604	2441(64.6%)

Cause of Death and Parity

It was found that haemorrhage infection and eclampsia ranked equally (4% respectively) as the leading causes of death among primigravidae (Table 4). Haemorrhage (16%) followed by infection and eclampsia (8% respectively) were the greatest cause of death among women whose parity ranged from l-3 children. Among women having 4-5 children it was haemorrhage (18%), followed by infection (l0%) and then anaemia, ruptured uterus and obstructed labour (2% respectively). Then for women of parity >5 children, haemorrhage (6%) and obstructed labour (4%) were the leading cause of death. The results shows that eclampsia was not recorded for women with 4 children and above, and anaemia and ruptured uterus was not reported for primigravidae and women with 1-3 children. In general haemorrhage was the highest cause of maternal death among women of parity ranged from 1 – 5 children. This confirms the study of [12, 13], who reported that post-partum haemorrhage (PPH) is the most common death cause of maternal mortality globally. Another observed leading cause of death (obstructed labour 4%) was also consistent with [6, 12-14], which listed prolonged labour (4%) and other causes such as precipitous labour, over distended uterus, retained placenta fragments and/or blood clots, high parity and genital tract or perineal lacerations as the causes of post-partum haemorrhage that results in maternal deaths. Also, eclampsia according [15], occurs in young primigravidae, first pregnancies from a new partner but in mothers over 35 years of age, it may be super imposed upon an already existing hypertension. This may explain why eclampsia is also a leading cause of death among primigravidae. The above finding is also in consonance with that of [14], where 71.4% of death due to eclampsia was in nulliparous women while post-partum haemorrhage increased significantly as parity increased.

Table 4: Cross tabulation of Cause of Death and Parity

Case of death		Parity				Total
		Primigravidae	1-3	4-5	>5	
Eclampsia	Count	2	4	0	0	6
	% of Total	4.0%	8.0%	0.0%	0.0%	12.0%
Haemorrhage	Count	2	8	9	3	22
	% of Total	4.0%	16.0%	18.0%	6.0%	44.0%
Infection	Count	2	4	5	1	12
	% of Total	4.0%	8.0%	10.0%	2.0%	24.0%
Anaemia	Count	0	0	1	1	2
	% of Total	0.0%	0.0%	2.0%	2.0%	4.0%
Ruptured uterus	Count	0	0	1	1	2
	% of Total	0.0%	.0%	2.0%	2.0%	4.0%
Obstructed Labour	Count	0	0	1	2	4
	% of Total	0.0%	0.0%	2.0%	4.0%	8.0%
Others	Count	0	1	0	1	2
	% of Total	0.0%	2.0%	0.0%	2.0%	4.0%

Cause of Death and Maternal age

It was observed that Haemorrhage (42%) followed by infection (18%) were the main cause of death in women of aged 25 years and above while infection (6%) followed by eclampsia (4%) were the main cause of death in women aged 15-24 years of age (Table 5). While anaemia ruptured uterus and obstructed labour were not recorded among women aged 15-24 yrs, eclampsia was not recorded among women aged 35yrs and above, a similar submission by [15]. Eclampsia occurs more in first pregnancies which usually occurs in young women within age 15 - 24 years. This study also confirms the findings of [14], where most of death recorded due to PPH was 67.7% and they occurred in women aged over 29 years while 64% of the death due to eclampsia occurred in those under 25 years of age which usually is the age bracket of most primigravidae.

Table 5: Cross tabulation of Cause of Death and Maternal age

Case of death		Marital age (years)			Total
		15-24	25-34	35 above	
Eclampsia	Count	2	4	0	6
	% of Total	4.0%	8.0%	0.0%	12.0%
Haemorrhage	Count	1	17	4	22
	% of Total	2.0%	34.0%	8.0%	44.0%
Infection	Count	3	6	3	12
	% of Total	6.0%	12.0%	6.0%	24.0%
Anaemia	Count	0	1	1	2
	% of Total	0.0%	2.0%	2.0%	4.0%
Ruptured uterus	Count	0	2	0	2
	% of Total	0.0%	4.0%	0.0%	4.0%
Obstructed Labour	Count	0	2	2	4
	% of Total	0.0%	4.0%	4.0%	8.0%
Others	Count	0	1	1	2
	% of Total	0.0%	2.0%	2.0%	4.0%
Total	Count	6	33	11	50
	% of Total	12.0%	66.0%	22.0%	100.0%

Conclusion

Generally there has been a decrease in maternal mortality rate since 2009, however the rate still remain high. This decrease tends to correlate with increase in antenatal care registration over the period. There was also a correlation between reduction of maternal death and increase in birth delivered by skilled attendance. While a correlation between reduction MMR and increase employment of skilled staff was established, it seems that employment of higher skilled or cadre of health personnel tend to have a more dominant impact. The greater cause of death over the period was hemorrhage, followed by infection then eclampsia and obstructed labour, anemia, ruptured uterus and others. There seems to be a relationship between cause of death and parity as well as between cause of death and age.

Recommendations

It is however recommended that:

- Efforts should be made to sustain or increase antenatal services within the local government.
- The central hospital; Warji and the primary health care centers should have a functioning and reliable data pool on maternal health services.
- The need for employment of more skilled staff especially those emergency obstetric care skills are obvious.
- More study are required to unravel the cause of disparity between ANC and number of delivery by skilled attendants. The need to follow the utilization of ANC service which seems to be reducing at the moment is also obvious.

- More studies are also required to establish the exact nature of relationship between cause of death and parity as well as between cause of death and age within the locality.

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Conflict of interest: None

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