Maternal death surveillance and response system in Northern Nigeria

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ABSTRACT

Introduction: The maternal death surveillance and response (MDSR) responds to MDG 5 and Sustainable development goal 3. It was designed to achieve this goal by obtaining and strategically using information to guide public health actions and monitoring their impact.

Objective: To determine the burden and avoidable causes of maternal mortality in midwives service scheme (MSS) communities in Northern Nigeria.

Methodology: This was a cross-sectional study using baseline MDSR data on confidential enquiry into maternal deaths in all health facilities and their host communities under the MSS in Northern Nigeria from July 1st to December 31st, 2011.

Results: The MMR was 181/100,000 live births. Most (80.9%) of the deaths were due to direct obstetric complications with obstetric hemorrhage and eclampsia accounting for 66.6% of the deaths. Most deaths occurred postpartum (93.6%) with the first 48 h accounting for 85.1% of cases. At presentation, 76.5% were in critical conditions. The TBAs conducted 50.0% of the deliveries. Delays in decision making contributed to 51 (63.8%), delay in arriving at the facility accounted for 48 (60.0%), financial constraints 28 (35.0%), unsafe traditional practice 27 (33.8%), and use of traditional medicines 22 (27.5%). The TBA failed to refer early in 42 (52.5%), failed to recognize dangers signs in 27 (33.8%). Stillbirths occurred in 22.2% of cases.

Conclusion: Most maternal deaths in Northern Nigeria are preventable. Operational research using the MDSR is very useful in determining the causes and designing appropriate response to maternal deaths at the community level in Nigeria.

Key words: Maternal death surveillance response; Northern Nigeria; maternal death surveilance.

Introduction

Maternal death is caused by either complications that develop directly as a result of pregnancy, delivery or the postpartum period (a "direct obstetric death"), or due to an existing medical condition (an "indirect obstetric cause"). There are several avoidable factors that contribute to these deaths which can be grouped into: socio-economic and cultural factors (especially related to the household/family level), factors relating to accessibility of health facilities by pregnant women with obstetric complications, and factors around quality of care which includes timeliness in receiving care at the health facilities.[1]

Accurate estimates of national MMR require: complete records of all deaths; good attribution of causes of death; and knowledge of the pregnancy status of women of reproductive age who die. A critical analysis of these issues after every maternal death will guide the health facilities,

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local authorities, and the Ministries of Health to identify the major factors contributing to these deaths and assist in designing appropriate interventions to prevent them.

Of the eight United Nations Millennium Development Goals, the goal of reducing maternal mortality was the one that remains the furthest from reaching its targets.[2-4] The inability to reliably measure levels and trends contributes to a lack of accountability and, in turn, to lack of progress. A maternal death surveillance and response system that includes maternal death identification, reporting, review, and response can provide the essential information to stimulate and guide actions to prevent future maternal deaths and improve the measurement of maternal mortality.

In September 2010, the Secretary-General of the United Nations launched the Global Strategy for Women's and Children's Health, focusing on the 49 lowest-income countries where maternal and child mortality rates are the highest.[5] The Commission on Information and Accountability for Women's and Children's Health, established in the wake of that report, stressed the lack of reliable data to monitor progress and also flagged issues concerning the quality of care. The Commission's ten recommendations, announced on September 2011, focused on strengthening country and global accountability.[6] The Commission urged countries to improve their health information systems, take significant steps to develop civil registration and vital statistics systems, and introduce innovative methods to count all maternal deaths and to review and better monitor progress.

Maternal mortality measurement, including numbers of deaths, their causes, and circumstances, remains a challenge in low-income countries.[6] Only two of the 49 lowest-income countries have functional, civil registration, and vital statistics systems, the preferred source of data for counting deaths.[7] In the absence of such systems, alternative methods used to collect retrospective data on maternal mortality include census (recent deaths in the household), household surveys (sibling survival history), and special studies. The uncertainty of statistics derived using these methods tends to be very large. Furthermore, the data refer to the past and are generally not available at the sub-national level, making them unsuitable for proactive response, planning, or resource allocation.

Accurately assessing progress on maternal mortality reduction is challenging because of the lack of complete civil registration systems that reliably attribute the cause of death. An accurate and complete civil registration system depends on the precise identification of causes of maternal deaths

that occur at health facilities, those identified by postmortem pathological examinations and verbal autopsies.

A maternal death surveillance response (MDSR) system involves the identification, notification, quantification, and determination of causes of death and avoidable contributing factors to death. MDSR systems use this information to develop an appropriate response to prevent future maternal deaths and improve the measurement of maternal mortality. MDSR builds on the implementation of maternal death review (MDR), but MDSR emphasizes the importance of real-time, systematic monitoring of maternal mortality, trends, and causes of death at the community and facility levels. MDSR stresses the importance of taking action to reduce avoidable maternal mortality.[8,9]

In Nigeria, the Government aimed to reduce the number of maternal deaths by three quarters by 2015, from the 1990 baseline of 1000 in line with the Millennium Development Goals, but government statistics showed that 545 women die for every 100,000 births.[10] Nigeria did not achieve the MDG's target.[11]

In Nigeria, vital registration is inadequate and most maternal deaths occur at home, and the prevailing causes of these deaths are not determined. Health policymakers and programmers require these data to identify health priorities, evaluate the impact of health program, and allocate scarce resources. There are effective interventions to significantly reduce mortality and improving maternal health. The problem is poor coverage and access to these interventions by population in critical need for such lifesaving services. Among the several constraints faced by women in seeking care during pregnancy and childbirth in Nigeria, shortage of skilled birth attendants is one of the most important. Because delivery by a skilled birth attendant is crucial to the health of women and newborns, skilled attendance at delivery has become a proxy indicator for reducing maternal mortality.[11]

The midwives service scheme (MSS) was designed to address the shortage of skilled birth attendants at a primary health care level in rural communities in Nigeria. The MSS was launched in 2009 and 4000 midwives were enlisted and deployed to 1000 primary health care facilities nationwide. The MSS instituted a bimonthly cluster monitoring exercise using: a checklist list tool to determine the midwives presence, activity, and challenges; and a data collection tool to collect maternal newborn and child health data at the facility. Information on maternal and neonatal mortality was also collated and analyzed and appropriate actions are taken as part of the MDSR process. Northern Nigeria has the highest

burden of maternal mortality in the country.[12,13] It is zoned into North-East, North-West, and North-Central. The study was conducted to determine the levels and root causes of maternal mortality in Northern Nigeria to assist in designing appropriate interventions to reduce them at the start of the MDSR process in these facilities.

Methodology

The study setting was primary health care facilities and their host communities that were supported by the MSS scheme in all the states in the three geopolitical zones of Northern Nigeria including the Federal Capital Territory Abuja. This was a cross-sectional study using baseline MDSR data on confidential enquiry into maternal deaths in all health facilities and their host communities under the MSS in Northern Nigeria from July 1st to December 31st, 2011 using MDR tools.

The first step in this process was the development of a concept note and the maternal death audit tools. This took place on 24th–29th January 2012. This was followed by a meeting of National stakeholders to build consensus on the concept note and adopt the tools on the 7th of February, 2012. A total of five MDR tools were used for the activity namely: The Facility Review Forms, the MDR Form, Maternal Death Notification Form, Maternal Follow up Form, and Community Death Review Form. A training of trainers of the state review team members from all the states in the North were conducted at the zonal level on the 20th and 21st February 2012.

The (MDR was conducted by the state MDR team. The five members of the State team were drawn from the State Ministry of Health, School of Midwifery, School of Health Technology, State Primary Health Care agency, and MSS state focal persons. The fieldwork lasted for 15 days and was conducted from 5th to 19th March 2012.

Data collation, entry, analysis, and report writing took place from 15th to 30th June 2012. The data analysis was done using SPSS. The study coordinator provided technical direction for the activities.

Responses were designed to address the causes of these deaths in MSS facilities and communities as appropriate.

Results

Out of the 272 maternal deaths reported from the MSS sites in Northern Nigeria between July and December 2011, 141 (51.8%) were confirmed as maternal deaths. Table 1 shows the common causes of maternal death while Table 2 shows the distribution of maternal deaths by states. The other 131 deaths were either

stillbirths or deaths after six weeks of delivery or deaths that were not related to pregnancy and were excluded from this study. There were 77,869 live births in these facilities during the period giving an overall MMR of 181/100,000 live births. Most (80.9%) of the deaths were due to direct obstetric complications with obstetric hemorrhage and eclampsia accounting for 66.6% of the deaths. The stillbirth rate was 18/1000 total deliveries. In total, 50% of the deaths occurred in women aged 20–34 years.

Most of the deaths occurred at term (97.0%). The intrapartum 11 (7.9%) and postpartum 98 (70.0%) period accounted for 77.9% of all the deaths. Most (93.6%) of the postpartum deaths occurred in the peripartum period particularly within the first two days (85.1%) of the puerperium. Most (92.4%) of the women who delivered had a spontaneous vaginal delivery. TBAs and relatives conducted 50.0% of the deliveries while midwives, community health workers, and medical officers conducted 27.2%, 14.1%, and 8.7% of the deliveries, respectively.

At presentation, 76.5% were in critical conditions. The TBAs conducted 50.0% of the deliveries. Delays in decision making contributed to 51 (63.8%), delay in arriving at the facility accounted for 48 (60.0%), financial constraints 28 (35.0%), unsafe traditional practice 27 (33.8%), and use of traditional medicines 22 (27.5%). The TBA failed to refer early in 42 (52.5%), failed to recognize dangers signs in 27 (33.8%). Out of the 68 (48.6%) women who were admitted alive at the health facility before their death, 76.5% were admitted in critical condition while 23.5% were admitted in stable condition.

Discussion

Principal findings and the significance

Only 51.8% of pregnancy-related deaths were confirmed as maternal deaths. The MMR was 181/100,000 live births. Most (80.9%) of these deaths were due to direct obstetric complications with obstetric hemorrhage and eclampsia accounting for two-thirds of the deaths. Most of the deaths (70.0%) occurred on the first day of postpartum. Most (93.6%) of the postpartum deaths occurred in the early neonatal period particularly within the first two days (85.1%) of the puerperium. At presentation, 76.5% were in critical conditions. The TBAs conducted 50.0% of the deliveries. Patient (87.2%) and community (79.4%) factors were the commonest contributory factors to the deaths, and administrative factor was the lowest (34.0%). Community factors were mainly contributed by the TBAs.

Strength and weaknesses of the study design

The comprehensive nature of this assessment in all the Northern States using facility-based assessment and the

verbal autopsy shows that MDSR is an achievable intervention in Nigeria. The major limitation of the study was the fact that it was conducted in only the MSS facilities and their host communities. These facilities represented about 20% of the LGA in these states. This study, therefore, represents the tip of the iceberg of maternal deaths in these states.

Table 1: Common causes of maternal deaths

Cause of death		
Direct	**Number**	**%**
PPH	48	34.0
Eclampsia	26	18.4
APH	20	14.2
Obstructed labor	10	7.1
Puerperal sepsis	4	2.8
Acute collapse	3	2.1
Ruptured uterus	2	1.4
Incomplete abortion	1	0.7
Total	114	80.9
Indirect		
Anemia	12	8.5
Malaria	7	5.0
Total	19	13.5
Medical		
Asthma	1	0.7
Congestive heart failure	1	0.7
Meningitis	1	0.7
Total	3	2.1
Unknown	5	3.5
Grand total	141	100

Comparison of the findings with those of other studies

The study showed a maternal mortality ratio of 181/100,000 live births. This ratio is much lower than the national average of 545/100,000 and other studies in the country. The major causes of mortality were obstetric haemorrhage and eclampsia which were similar irrespective of whether the patient dies in a health facility or home. This finding was similar to that of Garba *et al.* in Sokoto Nigeria.[6] The low MMR may be due to the referral of women with obstetric complications to higher level facility or underreporting of home deaths from the verbal autopsy. Verbal autopsy as a tool for the identification of maternal death is very specific but not very sensitive. Chandamohan found a specificity of 98.0% and a sensitivity of 60.0%. The sensitivity, however, increases with cases like antepartum and postpartum hemorrhage.[7]

Despite the many numbers of scoring systems for predicting maternal deaths during ANC, none has been too reliable. There is no significant correlation in terms of morbidity and mortality among pregnant women depicted either as high or low risk. Demographic indices like age and parity have not also been shown to be reliably predictable.[8,9] The most important factors in maternal deaths are where the woman delivers, who attended to her at delivery, and how quickly they get to the facility.[10] Our study showed defect at each of these points.

Table 2: Distribution of maternal deaths by states

State	Maternal deaths in target community	Maternal deaths in PHC facility	Total maternal deaths	Live births in PHC facilities	MMR/100,000 live births
Adamawa	1	4	5	2928	171
Bauchi	8	2	10	4449	225
Benue	1	0	1	938	107
Borno	19	10	29	3150	921
FCT*	2	2	4	1238	324
Gombe	2	4	6	4810	125
Jigawa	0	8	8	4926	163
Kano	0	3	3	5648	54
Kaduna	0	0	0	24,057	0
Katsina	5	22	27	4893	552
Kebbi	1	1	2	2641	76
Kogi	0	2	2	1543	130
Kwara	0	0	0	1008	0
Nasarawa	2	2	4	896	447
Niger	1	1	2	1602	125
Plateau	2	5	7	859	815
Sokoto	16	3	19	3589	530
Taraba	1	6	7	2085	336
Yobe	3	2	5	3835	131
Zamfara	0	0	0	2774	0
Total	64	77	141	77,869	181

Only live births in the facilities were used as denominators for the Maternal mortality ratio (MMR), *Federal Capital Territory Abuja

In most of the facilities where deliveries occur, there were gaps in terms of emergency obstetric care, birth preparedness, and complication readiness. The levels of peripartum care determine women's survival implying the need for the training on the obstetric lifesaving scheme.[11] Delays in referring, transportation, and referral logistics played prominent roles in all the maternal deaths studied. If the timely intervention had been given, most of the deaths could have been averted. In India, Raj *et al*. also found that delays, inappropriate referral, transportation cost, and health facility gaps in terms of provision of emergency obstetrics care are the main causes of maternal mortality. He further reported that 23.0% and 30.0% of the deaths occurred at home and transit, respectively, with most of them taken to at least two hospitals. In our study, 35.3% died at home and 13.0% died on transit showing that the decision to go to the hospital is taken later than in India. The study showed that verbal autopsy was a useful tool in investigating the causes of maternal mortality. In Tanzania, maternal mortality was related to ethnicity, religious beliefs, and illiteracy. Unlike in Tanzania where the ages 35–49 years had the highest risk, most deaths in our study were from the ages 20–34 years.[12]

The role of TBA in the mortality was high as they took about 50% of the deliveries and accounted for most of the community factors. Despite the long-standing history of traditional birth attendance, evidence has not supported their role in mortality reduction. Apart from Brazil, Guatemala, and Indonesia, even trained TBAs have not been shown to reduce mortality. A situation where they are encouraged to take all patients for booking and skilled birth attendants during delivery for a stipend may be a better alternative.[13,14] Postpartum care of mothers by CHEW is, however, being encouraged especially the newborn care.[15]

Meaning of the study and its implication

The real risk factors for maternal deaths are the avoidable factors; particularly, home delivery, patient and community factors, and neglected peripartum period. The implication of the finding is that there should be a paradigm shift in the provision of maternal and newborn services in favor of emergency obstetric care, labor, delivery, and the peripartum period. The refocusing of antenatal care will give health workers more time to manage women during the labor and delivery period. A population-based approach with strong community mobilization to improve demand for services will be more impactful than the current high-risk approach. Such an approach should include key household practices and health promotion activities to encourage recognition of warning signs by pregnant women.

Unanswered questions and specific areas for future research

So many interventions have been implemented in these facilities and the host communities since the study was conducted. It is recommended that further research should be conducted to assess the impact of these interventions on maternal mortality reduction.

Conclusion

This study has shown that most causes of these deaths are treatable, so we recommend a population-based approach for the reduction of maternal deaths rather than the conventional risk approach. This approach will include counseling all pregnant women on the danger/warning signs of obstetric complications, birth preparedness, and complication readiness to avert delay in women with obstetric emergencies. These can be achieved by: preventing pregnancy by family planning, early detection of complications, and preventing death or disability from complications. These can be achieved by implementing interventions at various: levels of care (home, primary, and secondary health facilities); time period (pregnancy, labor and delivery, and postpartum), and the strategic approach—population-based versus personal interventions. This will achieve: primary, secondary, and tertiary prevention strategies. Prompt quality emergency obstetric care in the peripartum period among other interventions remains the cornerstone of making a meaningful impact in maternal mortality reduction in Northern Nigeria.

In Nigeria, we need to initiate and implement a good civil registration system and also create the enabling environment that will promote the practice of postmortem examinations and verbal autopsies which are necessary for the correct identification of the causes of maternal death.

Conflicts of interest

There are no conflicts of interest.

References

1. Muoghalu CO. Socio-economic and cultural factors in maternal mortality in Nigeria. Gender & Behaviour 2010;8:2.
2. The Millennium Development Goals Report 2011. New York: United Nations; 2011.
3. Trends in Maternal Mortality: 1990 to 2008. Geneva: World Health Organization; 2010.
4. Lozano R, Wang H, Foreman KJ, Rajaratnam JK, Naghavi M, Marcus JR, *et al*. Progress towards millennium development goals 4 and 5 on maternal and child mortality: An updated systematic analysis. Lancet 2011;378:1139-65.

5.   United Nations Secretary-General Ban Ki-moon. Global Strategy for Women's and Children's Health. New York: United Nations; 2010. Available from: http://www.un.org/sg/hf/Global_StategyEN.pdf. [Last accessed on 2011 Oct 10].

6.   Commission on Information and Accountability for Women's and Children's Health. Keeping Promises, Measuring Results. Geneva: World Health Organization; 2011. Available from: http://www. everywomaneverychild.org/images/content/files/accountability_ commission/final_report/Final_EN_Web.pdf. [Last accessed on 2011 Oct 10].

7.   Abouzahr CA. New estimates of maternal mortality and how to interpret them: Choice or confusion? Reprod Health Matters 2011;19:117-28.

8.   Danel I, Graham WJ, Boerma T. Maternal deaths surveillances and response. Bull World Health Organ 2011;89:779-9A.

9.   Brouwere VD, Lewis G, Filippi V, Delvaux T, Beyeza-Kashesya J, Gebrehiwot Y, *et al*. Maternal death review. Lancet 2013;381:1718-9.

10.   UNDP. MDG in Nigeria: Current progress. UNDP programme – Nigeria; 2007.

11.   Ogunlela YI. An assessment of safe motherhood initiative in Nigeria and the achievement of the millennium development goals number 5. Soc Sci 2012;7:353-60.

12.   Doctor HV, Findley SE, Afenyadu GY. Estimating maternal mortality level in rural Northern Nigeria by sisterhood method. Int J Popul Res 2012, Article ID 464657. [Retrieved on 2013 Sep 20].

13.   Garba JA, Umar S. Aetiology of maternal mortality using verbal autopsy at Sokoto, North Western Nigeria. Afr J Prim Health Care Fam Med 2013;5:1-6.

14.   Sibley L, Sipe TA, Koblinsky M. Does traditional birth attendant training improve referral of women with obstetric complications: A review of the evidence. Soc Sci Med 2004;59:1757-68.

15.   Bang AT, Bang RA, Baitule SB, Reddy MH, Deshmukh MD. Effect of home-based neonatal care and management of sepsis on neonatal mortality: Field trial in rural India. Lancet 1999;354:1955-61.