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Verbal autopsy of preventable maternal deaths in Nigeria

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Abstract
Introduction: Verbal autopsy is a method of finding out the medical causes of death and ascertaining the personal, family or community factors that may have contributed to the death in women who died outside of a medical facility.
Objective: To determine the avoidable factors contributing to maternal deaths at the communities with Midwives Service Scheme (MSS) facilities in Northern Nigeria using verbal autopsy.
Methodology: This was a 6 month confidential enquiry of all reported maternal deaths at the MSS facilities and the host communities in Northern Nigeria from 1st July, 2011 to 31st December, 2011 using verbal autopsy tools.
Results: One or more avoidable factors were identified in 89% of the 141 maternal deaths. Socio cultural factors are the commonest avoidable cause of maternal mortality. TBAs, inadequate lifesaving skills, delay in referral and poor patient monitoring are the commonest avoidable factors seen in the health workers. Lack of transportation is a cross cutting avoidable factor contributing to all levels of delay in women with obstetric complications. Non availability of signal functions for a basic emergency obstetric care facility is responsible for 61% of administrative avoidable factors. Most (70%) maternal deaths occur postpartum. Most deliveries (56%) in these women were at home but most (52%) of them died at the health facility. TBAs conducted 50% of the deliveries. Out of the 73 that were alive at presentation in the health facility only 20(27%) were admitted in stable condition.
Conclusion: Addressing preventable maternal mortality is key to achieving the SDG goal for Nigeria.

Keywords: Verbal autopsy, avoidable factors, preventable maternal mortality

1. Introduction
Maternal death is "[The] death of a woman while pregnant or within 42 days of the end of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes"[1]. Maternal deaths occur when the underlying obstetric complication is acted upon by avoidable/contributory factors. Such deaths are called preventable/avoidable maternal deaths. Underlying cause is the disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury [2]. Contributory cause is defined as a condition that may exist prior to development of the underlying cause of death or develop during the chain of events leading to death and which, by its nature, contributed to the death [2]. The main causes of maternal mortality are known, and more than 80% of maternal deaths could be prevented/ avoided through actions that are proven to be effective and affordable, even in the poorest countries in the world [3]. 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") [4]. here are several avoidable/preventable factors that contribute to these deaths which can be grouped into: level 1, Socio-economic and cultural factors (especially related to the household/ family level); level 2, Factors relating to accessibility of health facilities by pregnant women with pregnancy/ labour complications; and level 3, Factors around quality of care which includes timeliness in receiving care at the health facilities. (REF)
Vital registration is the gold standard to capture maternal deaths. Unfortunately such records are absent in Nigeria. Verbal autopsy and facility based maternal death review remains the other alternatives in the country. A verbal autopsy for maternal deaths is a method of finding out the medical causes of death and ascertaining the personal, family or community factors that may have contributed to the death in women who died outside of a medical facility [3]. The verbal

autopsy consists of interviewing people who are knowledgeable about the events leading to the death such as family members, neighbours and traditional birth attendants. The main purposes of a verbal autopsy are to: identify deaths that have occurred in pregnant or recently delivered women; provide broad categories of causes of maternal death; and understand the factors that may have contributed to the deaths [3].

Global initiatives to intensify policy intervention for maternal mortality began with the Safe Motherhood Initiative in 1987 [5] a response to growing recognition that primary health-care programmes in many developing countries were not adequately focused on maternal health [5]. The 1994 International Conference on Population and Development strengthened international commitment to reproductive health [7, 8]. The focus on maternal mortality was sharpened when reduction in maternal mortality became one of eight goals for development in the Millennium Declaration (Millennium Development Goal [MDG] [5, 9] The Maternal Death Surveillance and Response MDSR responds to MDG5. It was designed to achieve this goal by obtaining and strategically using information to guide public health actions and monitoring their impact [9].

MDG 5 was far from being achieved as worldwide maternal mortality ratio (MMR) declined by 44 % from 1990 to 2015 [11]. To accelerate progress, the Secretary-General of the United Nations launched the Global Strategy for Women's and Children's Health 2016-2030 in September 2010 [12]. The Commission on Information and Accountability (CoIA) was then formed to determine the most effective international institutional arrangements for global reporting, oversight, and accountability on women's and children's health. Among CoIA's key recommendations is a focus on getting better information for producing better results. It recommends setting up efficient health information systems that combine data from facilities, administrative sources, and surveys [12]. The framework for implementing these recommendations, developed by the World Health Organization, includes establishing MDSR systems and improving vital registration in each country.

MDSR has two underlying rationales: first, it Provides information about avoidable factors that contribute to maternal death and using the information to guide actions that must be taken at the community level, within the formal health-care system, and at the inter sectoral level (i.e. in other governmental and social sectors) to prevent similar deaths in the future. Secondly, it establishes the framework for an accurate assessment of the magnitude of maternal mortality, permitting evaluators to assess more accurately the effectiveness of interventions to reduce maternal deaths. It also helps provide accountability for results and compels decision-makers to give the problem the attention and responses it deserves.

In 2012, the UN Commission on the Status of Women developed an ambitious goal of eliminating preventable maternal mortality and morbidity [13] through universal access to family planning methods, skilled birth attendance, and basic and comprehensive emergency obstetric care. By providing information to guide corrective actions and monitoring real-time numbers of maternal deaths, MDSR and verbal autopsy became an essential element of any strategy for eliminating preventable deaths [10].

In 2013, the Ending Preventable Maternal Mortality (EPMM) Working Group, led by the World Health Organization (WHO) with support from partner organizations, achieved multi-stakeholder consensus on goals for maternal health and survival from 2015 to 2030. The EPMM targets for maternal mortality reduction at the global and country levels are: by 2030, the global average maternal mortality ratio (MMR) should be less than 70 maternal deaths per 100,000 live births; by 2030, every country should reduce its maternal mortality ratio by at least two thirds from 2010 baseline, and no country should have a ratio higher than 140 deaths per 100,000 live births (twice the global target); and all countries are tasked with achieving equity in MMR among sub-populations. The EPMM global MMR targets were incorporated into the Sustainable Development Goals (SDGs) adopted by member states and launched in late 2015 [14]

The post-2015 agenda on sustainable development is broader than the MDG agenda, with a greater number of non-health goals and a strong focus on inequity reduction; the new agenda includes an absolute reduction in maternal mortality as a marker of progress [15]. This new indicator is expected to be framed as targets for preventable maternal deaths [16]. The objective of the study was to determine the avoidable factors contributing to maternal deaths at the communities with MSS facilities in Northern Nigeria using verbal autopsy.

The Midwives Service Scheme (MSS) was designed to address the shortage of skilled birth attendants at primary health care level in rural communities in Nigeria. The Midwives Service Scheme was launched in 2009, and more than 4000 midwives were employed and deployed to 1000 Primary Health Care facilities nationwide. The objective of the study was to determine the avoidable factors contributing to maternal deaths at the communities with MSS facilities in Nigeria using verbal autopsy.

Methodology

This was a 6 month confidential enquiry of all reported Maternal deaths at the MSS facilities and the host communities in Northern Nigeria from 1st July, 2011 to 31st December, 2011 using verbal autopsy tools. The Midwives Service Scheme since inception had instituted a quarterly cluster monitoring exercise using a data collection tool to collect Maternal Newborn and Child Health (MNCH) data at the facility including information on maternal and neonatal mortality. Verbal autopsy was designed by the National Primary Health Care Development Agency (NPHCDA) as one of the strategies to facilitate the attainment of the 4th and 5th MDGs in Nigeria. The National committee domiciled at the NPHCDA co-ordinated the activities of the zonal/state teams. The state teams conducted the confidential enquiry and co-ordinated the facility based committees. The five members of the State team were drawn from the State Ministry of Health (SMoH), School of Midwifery (SoM), School of Health Technology (SHT), State Primary Health agency/ Ministry of Local Government (MoLG) and Midwives Service Scheme (MSS) state focal persons. A training of trainers of the state review team members from all the states in the Northern zones were conducted at the zonal level on the 20th and 21st February, 2012. The Field work lasted for 15 days and was conducted from 5th to 19th March, 2012. Data collection, collation, entry, analysis and report writing took place from 15th to 30th June, 2012. The study coordinator provided technical direction for the activities. This data was collated and analyzed to determine the avoidable/preventable/contributory factors of maternal mortality. This information was used to design appropriate interventions to reduce maternal mortality. The main outcome measures were: Patient, community, administrative and health worker related problems.

Results

There were 77,869 live births in these facilities during the period giving an overall MMR of 181/100,000 live births. 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. Out of the 73 that were alive at presentation in the health facility, 53 (73%) were admitted in critical condition while 20(27%) were admitted in stable condition. The other 131 deaths were either stillbirths or deaths after six weeks of delivery or deaths that were not related to pregnancy. These deaths were excluded from this study.

The patient or family factor were identified in 125 (89%) deaths. This was followed by Community 114 (81%) and TBA factors 77 (81%) (Table 1).Table 2 shows the level of delay. level 1 delay (delay in seeking care) was the contributory factor in 125 (89%) deaths, closely followed by level 2 (delay in accessing health care 114(81%). Delay in decision making 64% and delay in reporting to health facilities (60%) were the main patient family factors that contributed to the deaths (table 3). The main contributions at the level of the TBA, administrative and health workers factors were delay decision to refer and recognizing danger signs, transport problems and lack of blood and lack of lifesaving skills respectively Tables 4,5,6) most deaths (70%) occurred post-partum. The deaths occurred in following Home delivery79 (56%) and facility delivery 62 (44%). Seveny three (52%) of the deaths occurred in health facilities table 7. Most of the deaths followed spontaneous vaginal deliveries (93%) and 50% of the deaths were attended by TBAs table 8.

Table 1: Avoidable Factors

Factors	Contribution	%
Patient/Family	125	89
Community	114	81
TBA	77	55
Health workers	60	43
Administrative	56	40

Table 2: Level of delay

Level of delay	Contribution	%
1	125	89
2	114	81
3	60	43

Table 3: Patient/ Family Factors

Factors	%
Delay in decision making	64
Delay in reporting to health facility	60
Financial constraints	35
Unsafe traditional/cultural practice	34
Use of traditional medicine	28
Lack of transport from home to health facility	23
Refusal of treatment	21
Unsafe medical treatment	16

Table 4: TBA and Community Factors

Factors	%
Delay in deciding to refer	53
Failure to recognise danger signs	34
Use of traditional medicine	31
Failure to accept limitations	30
Lack of transport	29

Table 5: Administrative Factors

Factors	%
Transport problem between health facilities	28
Non-availability of blood	24
Lack of essential obstetric drugs	21
Lack of essential equipment, including resuscitation	16
Lack of laboratory facilities	16
Absence of trained staff on duty	9
Lack of qualified staff	6
Communication problem between health facilities	6

Table 6: Health Workers Factors

Factors	%
Lack of obstetric lifesaving skills	16
Delay in deciding to refer	10
Inadequate monitoring	9
Delay in starting treatment	6
Lack of training in midwifery/obstetric skills	4
No treatment	4
Inadequate resuscitation	3

Table 7: Time and place of deaths

Factors	Contribution	%
Pregnancy deaths	31	22
Intrapartum	11	8
Postpartum deaths	99	70
Home delivery	79	56
Health facility delivery	62	44
Home deaths	48	34
Health facility deaths	73	52
Died in transit or on arrival at the facility	20	14

Table 8: Delivery Status

Factors	Contribution	%
SVD	88	93
C/S	5	5
Vacuum delivery	1	1
Laparotomy	1	1
Deliveries by TBAs	46	50
Deliveries by Midwives	25	27
Deliveries by Community health officers	13	14
Deliveries by Medical Officers	8	9

Many of the home deliveries were attended by health workers.

Discussion

Main findings

One or more avoidable factors were identified in 89% of maternal deaths. Verbal autopsy is a veritable tool in differentiating maternal deaths from pregnancy related and other deaths. In this study, 51.8% of the reported deaths were confirmed as maternal deaths. Patient (Socio cultural, financial and transport constraints) factor (level one delay) is the commonest avoidable cause of maternal mortality. TBAs are responsible for most of the level 2 delays in the community. Inadequate lifesaving skills, delay in referral and poor patient monitoring are the commonest avoidable factors seen in the health workers. Lack of transportation is a cross cutting avoidable factor contributing to all levels of delay in women with obstetric complications. Non availability of signal functions for a basic emergency obstetric care facility is responsible for

61% of administrative avoidable factors. Most (70%) maternal deaths occur postpartum. Most deliveries (56%) in these women were at home but most (52%) of them died at the health facility. TBAs conducted 50% of the deliveries. Out of the 73 that were alive at presentation in the health facility only 20 (27%) were admitted in stable condition.

Comparison with other studies

The avoidable factors of 89% in this study is similar to 80% reported by WHO [17] and 90% reported from Zimbabwe [18] but lower than the 27.7% and 54.3% reported from Enugu and Morocco respectively [19, 20]. The lower rates are due to the fact that these are hospital based data while our study is a community based data.

The delay in decision making of 64% and 81% community factors reported from this study are higher than the 32% and 47% reported from Zimbabwe respectively [18]. The reported lack of transportation from home to health facility of 23% and the 52% health facility maternal deaths are similar to the 28% and 50% reported from the same Zimbabwean study respectively [18].

One method of addressing the gaps concerning causes of maternal deaths is by conducting a verbal autopsy of pregnancy-related deaths. The verbal autopsy tools and their validation have been refined over the last few years. A number of studies based on thousands of deaths have been reported from China and parts of Africa [21, 22, 23, 24, 25, 26, 27, 28].

Significance of the findings

In order to reduce maternal mortality, information on the; magnitude, underlying and avoidable causes are critical. Unfortunately, in Nigeria, most of the studies are focused only on the magnitude and underlying causes. A description of avoidable factors surrounding each maternal death using verbal autopsies is essential because it serves as a basis for the development of more comprehensive strategies for prevention. The nonmedical circumstances in which the woman dies help identify the many barriers to women's access to and use of comprehensive obstetric services.

This study is helpful in making decisions with respect to appropriate planning, resource allocation, and evaluating impact of interventions. In the absence of vital registration, verbal autopsy is a valuable tool in the study of maternal deaths in the communities. In developing countries, those ascertaining the avoidable factors have almost invariably consisted of medical professionals or researchers [18, 29], It has been suggested, however, that a multidisciplinary team should review the data [18], as was done in this study. This action will influence policy since the active participation in undertaking reviews to determine avoidable factors by all those concerned with saving mothers' lives is almost certainly a more powerful trigger for change than the mere presentation of statistics.

Implications of the findings

Most health interventions in Nigeria have been implemented to increase the supply of maternal health services rather than creating the demand for these services. This study is useful in designing evidence-based approaches, to overcome financial and socio-cultural barriers to service utilization. Measures should be taken to ensure that the quality of care provided through health interventions is adequate and able to lead to significant reductions in mortality.

There is a need to address the sociocultural causes of maternal mortality in Northern Nigeria and create awareness of danger signs at the community level. The findings of this study calls for a renewed interest in post-partum care, improved quality of training of SBAs, increased availability and accessibility of Em ONC services and improvement of quality of care. Most importantly, dissemination of the findings of the study to policy-makers, planners, professionals, and the community at appropriate forums for sensitization and action should be ensured. There is a need for the Nigerian Government to reconsider continuing the MSS scheme, making efforts to improve the scope and quality of data on avoidable causes of maternal mortality.

Limitations of the study

This study was limited to women who had maternal deaths in Northern Nigeria and is very useful in secondary and tertiary prevention of deaths among women with obstetric complications however, there are drawbacks in comparing institutional and community avoidable deaths and designing facility based interventions based on community based study alone.

Unanswered questions

Further research should be conducted to develop better screening parameters and the role of avoidable factors in maternal mortality. Similar study should be conducted in Southern Nigeria to better understand the national picture.

Conclusion

There is a need for community mobilization on complication readiness plan and provision of transportation for women with obstetric complications to reduce maternal mortality. In addition, there is a need for evaluation of cost effective strategies using reliable evidence to address these avoidable factors. The implementation of these prioritized strategies and their continuous assessment is key to achieving the SDG goal for Nigeria.

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