ORIGINAL ARTICLE ASIAN JOURNAL OF MEDICAL SCIENCES

Maternal death audit- institutional based maternal death review in four major hospitals of Municipal Corporation of Delhi

Maruti Sinha[1], B.G. Venkatesh[2], Rekha Rani[3], Ramanjeet Kaur[4], Rekha Daral[5], Asha Aggarwal[6]

[1]Consultant, Obstetrics and Gynaecology, Kasturba Hospital, New Delhi, [2]Chief Medical Officer, OIVS, Civic Centre, [3]Chief Medical Officer, Obstetrics and Gynaecology and Family planning, Kasturba Hospital, New Delhi, [4]Senior Medical Officer, Obstetrics and Gynaecology, Kasturba Hospital, New Delhi, [5]Chief Medical Officer, Obstetrics and Gynaecology, Hindu Rao Hospital, New Delhi, [6]Medical Superintendent, Consultant, Obstetrics and Gynaecology, GLM Maternity Hospital, New Delhi

Submitted: 10-10-2014 Revised: 04-01-2015 Published: 14-02-2015

ABSTRACT

Objective: In India not much importance is still being given to Medical Audit & Death Audit which requires an in-depth analysis of maternal deaths with reference to the cause of death, ways in which the death could have been prevented and deficiencies in health care facilities.

Materials and Methods: Audit was conducted by Facility BMDR approach, across the various Municipal Corporation of Delhi Hospitals namely, 980 bedded Hindu Rao Hospital, 450 bedded Kasturba Hospital, 250 bedded Swamy Dayanand Hospital and 97 bedded Girdhari Lal Maternity Hospital

Results: The total deliveries combing all hospitals was 113237out of which 86859 were normal deliveries, 1572 deliveries were assisted forceps or vacuum deliveries and remaining 23403patients underwent lower segment caesarean section (LSCS). The total patients who lost life were 194. With reference to age group maximum deaths were observed in the age group 20-29 years, where out of 194 maternal deaths, 74(38.1%) deaths occurred in the age group of 20 to 24years and73 (37.6%) deaths between 25 to 29 years of age. Maximum deaths were observed amongst women who were pregnant for the first time in their life, namely 135(69.6%) out of the total of 194 maternal deaths. Haemorrhage was the major cause of maternal deaths 61(31.4%), followed by hypertension with related complications 25(12.9%) and septicaemia 24(24.4%). 84(43.3%) cases were haemo dynamically unstable at the time of admission. In 72 (37.1%) cases haemoglobin percentage in blood was not documented and of the remaining 122 cases, only15 (7.7%) had Hb above 11 gm%.

Conclusion: Death Audit can become a continuous evolving process to create awareness in health care facilities regarding their deficiencies and scope for improvements which unfortunately is well below par and requires standardization along with a comprehensive policy

Access this article online

Website: http://nepjol.info/index.php/AJMS

DOI: 10.3126/ajms.v6i4.11237

Key words: Maternal mortality, Institutional death, Medical Audit

INTRODUCTION

Surviving childbirth is a fundamental right of every woman. Yet in India one woman dies every eight minutes from a pregnancy related cause. India is ranked as the fourth worst country amongst 80 less developed nations in its survey, where more than half the births take place without a trained health professional.[1] Maternal death as defined by ICD-10 is death of a woman while pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. 'Direct Obstetric Deaths' refers to maternal deaths resulting from obstetric complications of the pregnant state – pregnancy, labour, puerperium, intervention, omissions, incorrect treatment or a combination of any of the above. 'Indirect Obstetric

***Address for Correspondence:**
Dr. Rekha Rani, Chief Medical Officer, Obstetrics and Gynaecology and Family planning, Kasturba Hospital, New Delhi.
E-mail: drrekharani@gmail.com **Mobile:** +919871155884

Deaths' are those resulting from previous existing disease or disease that developed during pregnancy and was aggravated by physiologic effects of pregnancy.[2]

Of the 5,36,000 deaths due to pregnancy and child birth complications that occur per year worldwide, 96% are reported from Africa and Asia alone.[3] In India, approximately 28 million women experience pregnancy and 26 million have live births annually An estimated 67,000 maternal deaths and 1 million new born deaths occur each year.[4,5] Targets to improve maternal health by National Rural Health Mission (NHRM) started in 2005 and WHO/ Millennium Development Goal 5(MDG 5) aims at reducing the Maternal Mortality Ratio by three quarters, between 1990 and 2015 and to achieve by 2015, universal access to reproductive health.[6]

World Health Organisation has recognised skilled birth attendants (SBS) like midwife, doctor or nurse as critical determinants for reducing maternal mortality in developing countries. Skilled training is essential for the identification of high risk pregnancies, management of normal uncomplicated pregnancies, childbirth and referral of complicated deliveries or compromised newborns.[7]

The aspect of 'dealings' in medical care along with examination & verification in a hospital is termed Medical Audit whose main objective is evaluation of medical care in retrospect through qualitative analysis of clinical records including analysis of hospital services. In relation to this another term Death Audit came into force which means a technique or process of quantitative death record analysis and compiling the information pertaining to professional activities of the hospital, as well as qualitative analysis and evaluation of the data so collected.[8]

The objective of our study was to determine the rate and causes of maternal mortality in pregnant women referred to tertiary care institutions, and to identify the factors contributing to the poor pregnancy outcomes in these women (including associated co-morbid illnesses, health infrastructure, prompt medical attention and availability of skilled manpower). We also aim to highlight the importance of death audit in ensuring quality control and stimulating improvement in clinical services.

MATERIAL AND METHODS

Methodology in this study, comprised of retrieval of case records of all maternal deaths over 5 years from 2006 to 2010 and review of maternal death via an audit conducted by Facility BMDR approach, across the various Municipal Corporation of Delhi Hospitals namely, 980 bedded Hindu Rao Hospital, 450 bedded Kasturba Hospital, 250 bedded Swamy Dayanand Hospital and 97 bedded Girdhari Lal Maternity Hospital, all four being tertiary care centres with high end health care facilities for natal care.

One hundred ninety-five cases were identified and demographic data with meticulous details of possible etiological factors like age, education, economic status and possible social disadvantage and any exclusion conditions were systematically recorded. Present and past history of states of pregnancy, details of antenatal care in current pregnancy, risk factors and disease conditions present during antenatal, intra natal and postnatal period, haemoglobin estimation were all recorded in detail for the study.

Relative facilities provision with respect to indoor bed strength, presence of Labour room, 24 hour Blood Bank and pathology services, trained personnel strength like doctors, nursing staff and paramedical staff were also tabulated in comparative charts.

RESULTS

Average bed strength was maximum in Kasturba Hospital with 330 beds & 60 doctors, Hindu Rao Hospital has 95 beds with 52 doctors, Swamy Dayanand Hospital has 50 beds with 21doctors & Giridari Lal Maternity Hospital has 67 beds with 16 doctors (Table 1).

Table 1: The bed distribution and doctors strength hospitals

Name of the hospital	Beds distributed in maternal services (OBG)	Number of posts of doctors			
		Specialist	General duty doctors	Senior residents	Junior residents
HRH	95	6	12	20	14
KH	330	14	22	12	12
SDNH	50	3	6	7	5
GLMH	67	2	6	2	6
Total	542	28	48	41	37

HRH=Hindu Rao Hospital, KH=Kasturaba Hospital, SDNH=SwamydayanandHospital, GLMH=GiridariLal Maternity Hospital

The specials maternal services other than routine out patient services in the hospitals are Special Ante natal checkups, Post natal follow-ups, Well baby clinic and Post partum units except in Giridhari Lal Maternity Hospital where Well Baby Clinic and Post partum clinic are not available (Table 2).

Among four hospitals the facility of 24hrs Radiology and chemist shop is only available in Hindu Rao Hospital. Blood Bank with laboratory facilities for basic emergency investigations are available in all other hospitals except Giridhari Lal Hospital (Table 3).

The total deliveries combing all hospitals was 113237out of which 86859 were normal deliveries, 1572 deliveries were assisted forceps or vacuum deliveries and remaining 23403patients underwent lower segment caesarean section (LSCS). The total patients who lost life are 194 (Table 4).

The trend of number of deliveries is almost increasing in all the hospitals except slight low in figures of Kasturba Hospital during the period of 2010. There is increasing number of deaths corresponding to the numbers of deliveries in almost all hospitals (Figure 1)..

Table 2: Special services available in four hospitals with respect to maternal care

S.no	Specials services	HRH	KH	SDNH	GLMH
1	ANC clinic	Available	Available	Available	Available
2	PNC clinic	Available	Available	Available	Available
3	Well Baby clinic	Available	Available	Available	Not available
4	Post partum unit	Available	Available	Available	Not available
5	Intensive care units	Available	Not available	Not available	Not available

HRH=Hindu Rao Hospital, KH=KasturabaHospital, SDNH=SwamydayanandHospital, GLMH=GiridariLal Maternity Hospital

Table 3: Availability of supportive services in four hospitals for round the clock

S.no	Supportive services	HRH	KH	SDNH	GLMH
1	Radiology- 24 hrs X- ray and USG	Available	Not available	Not available	Not available
2	Blood Bank 24 hrs	Available	Available	Available	Not available
3	Lab facilities 24 hrs for basic investigation	Available	Available	Available	Not available
4	24 hrs chest shop	Available	Not available	Not available	Not available

HRH=Hindu Rao Hospital, KH=KasturabaHospital, SDNH=SwamydayanandHospital, GLMH=GiridariLal Maternity Hospital

Table 4: The details of deliveries and maternal deaths among four hospitals during the period of 2006 to 2010

	Year	Normal delivery	Forceps assisted delivery	L.S.C.S. delivery	Total deliveries	Maternal deaths	Total deaths (Hospital wise)
HRH	2010	4737	133	1500	6370	29	104
	2009	4549	60	1317	5926	22	
	2008	3965	103	1437	5505	26	
	2007	3611	158	1309	5078	15	
	2006	3592	182	1120	4894	12	
	Total	20454	636	6683	27773	104	
SDNH	2010	3719	38	832	4660	7	29
	2009	3804	95	1275	5105	6	
	2008	4538	74	1068	6008	6	
	2007	4131	51	865	5048	5	
	2006	4274	41	946	5285	5	
	Total	20466	299	4986	26106	29	
KH	2010	7386	158	2444	9830	5	60
	2009	7656	93	2178	10303	10	
	2008	8928	101	2081	11365	15	
	2007	8343	46	2026	10893	13	
	2006	9121	47	1745	11514	17	
	Total	41434	445	10474	53905	60	
GLMH	2010	1413	75	233	1725	0	1
	2009	957	48	170	1302	0	
	2008	667	25	93	790	0	
	2007	598	10	54	662	0	
	2006	870	34	710	974	1	
	Total	4505	192	1260	5453	1	
Grand total		86859	1572	23403	113237	194	194

HRH=Hindu Rao Hospital, KH=KasturabaHospital, SDNH=SwamydayanandHospital, GLMH=GiridariLal Maternity Hospital

The demographic profile of maternal deaths were 3(1.5%) were teenagers, highest deaths are found in the age group of 20 to 24 i.e 74(38.1%) and almost similar pattern in the age group between 25 to 29 is 73(37.6%) and between age 30 to 34 and above 35 is 20(10.3%) and 21(10.8%). The age was not mentioned in 3(1.5%) cases. The present study showed that the maximum deaths occurred between20 to 29. Similar finding was also noted in the special bulletin RGI India 2009 (Figure 2).

Out of 194 maternal deaths, maximum deaths 135(69.6%) were observed among women who were pregnant for the first time in their life. Grand multipara women 52 (26.8%), pregnant for the fifth time or more constituted second highest maternal death group. Least deaths 7(3.6%) were observed amongst women who were pregnant more than twice but not more than 4 times (Table 5).

Table 5: Maternal deaths according to number of conceptions

No of times	No of maternal deaths	%
First time	135	69.6
2 to 4 times	7	3.6
5 and more times	52	26.8
Total	194	100

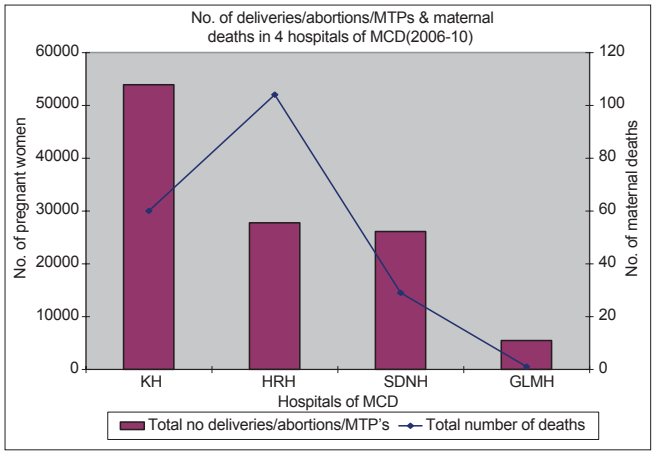

Figure 1: No. of deliveries/abortions/MTP's & Maternal Deaths in the 4 MCD Hospital

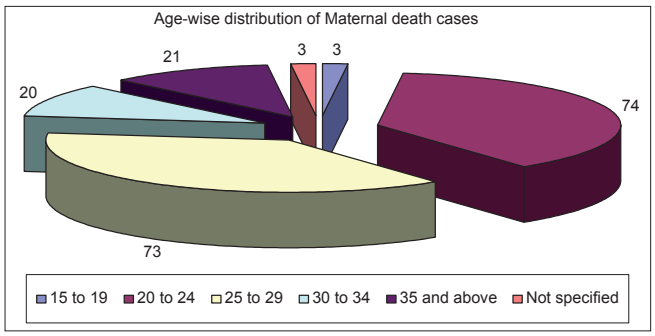

Figure 2: Demographic profile of maternal deaths

On ascertaining, out of 194 maternal deaths110 (36.7%) cases were stable with vital parameters within normal range and 84(43.3%) cases were unstable with deranged parameters and poor general condition. (Figure 3)

Out of 194 maternal deaths, 90 (46.4%) had anaemia, 48(24.7%) had hypertension, 20 (10.3%) had previous LSCS, 18 (9.3%) had ante partum haemorrhage, 7 (3.6%) had twin pregnancy and one each case with abnormal presentation and diabetes. The risk factor was not found on admission in 9 maternal deaths (Figure 4).

On identifying causes for death in 194 maternal deaths, haemorrhage was seen in 61(31.4%) cases and was the major cause of maternal death. Pulmonary Embolism was clinically diagnosed in 37(19.1%) patients Hypertension with superimposed Eclampsia and its complications, was the cause of death in 25 cases (12.9%) and 47 (24.2%) cases did not have any specified cause for the death (Figure 5).

Out of 194 maternal death cases, in 72 (37.1%) cases haemoglobin was not documented, 17(8.8%) had Hb%

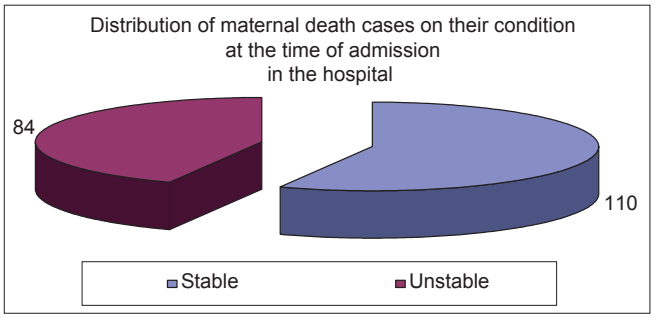

Figure 3: Distribution of death cases as per their condition at admission

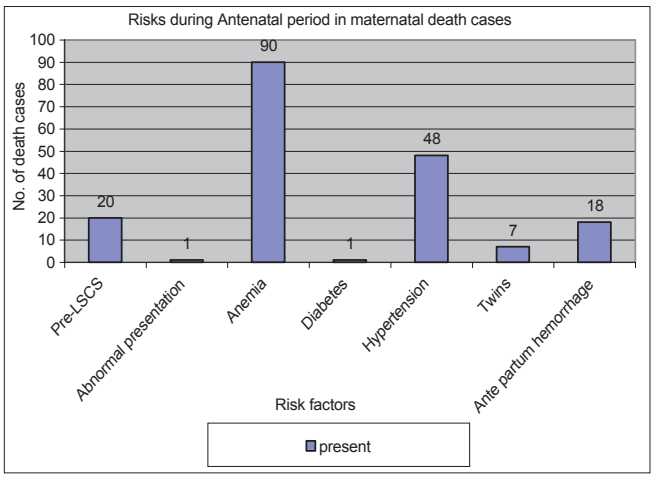

Figure 4: Risk factor during Antenatal period in mortality cases

ranged between 2 to 4.99 gm/dl, 42(21.6%) between 5-7.99 gm/dl, 48(24.7%) patients had Hb in the range of 8-10.99 gm/dl and 15(7.7%) cases had Haemoglobin levels above 11gm/dl (Table 6).

Outcome of the pregnancy in 194 maternal death cases were as follows: 98(50.5%) cases had live intrauterine pregnancies but mother died before baby could be delivered, 31(16%) delivered dead babies which had suffered Intrauterine deaths and had no foetal heart prior to delivery/or were alive in utero but died during delivery and hence were delivered as still births. 36(18.6%) delivered live babies weighing more than 2.5 kgs, 15 (7.7%) delivered live babies weighing 2.1 to 2.5 kgs and 5 (2.6%) delivered live babies weighing 1 to 1.5 kgs (Figure 6).

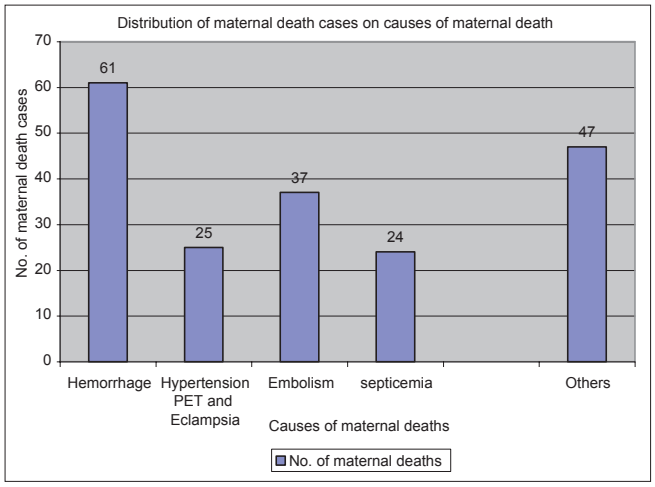

Figure 5: Cause of deaths amongst maternal mortality cases

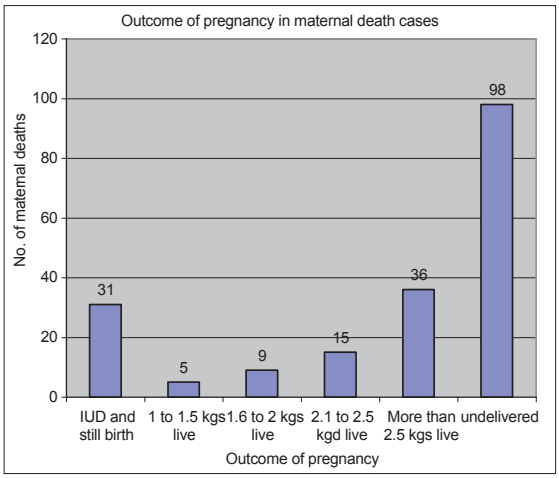

Figure 6: Outcome of pregnancy in maternal deaths

Table 6: Distribution of maternal deaths based on hemoglobin percentage in their blood

The hemoglobin gm/dl during admission of maternal cases	Frequency N (%)
Not known	72 (37.10
2-4.99	17 (8.8)
5-7.99	42 (21.6)
8-10.99	48 (24.7)
Above 11	15 (7.7)
Total	194 (100)

DISCUSSION

Maternal Mortality is an indicator of the quality of obstetrical care in a community directly reflecting the health care services available in the neighbourhood areas.[9]

Although the study tried to obtain complete information from available records, it was a very difficult task. The lack of standardization in maintaining medical records is one of the most challenging need to enhance the standard of care in maternal health services. The records of cases sheets in all the hospital are well catalogued, indexed, and arranged in series. However in majority of records the entries made in case sheets and death certificate for cause of deaths were not made as per ICD-10 classification.

This study should be regarded as only the tip of the iceberg of maternal deaths occurring in hospital settings. The number of maternal deaths occurring without reaching hospitals could be even greater & very difficult to assess.[10,11] Limited availability of health facilities with basic emergency obstetric care capacity, low staffing levels of Trained Birth attendants, lack of reliable documentation of data makes it difficult to assess the magnitude of the problem across socio economic groups of different geographical areas.[12,13]

Maternal death in a healthcare facility might also be a pointer to several other issues largely unrecognized and unaddressed till date, especially in rural settings, for example delays in recognition of complications, delay in making decisions to go to a health care facility, delay in reaching the hospital well in time to receive adequate care at the facility. Heavy dependability on public transport due to lack of emergency ambulance services in areas with poor infrastructure is a matter of grave concern. Unavailability of public transport at night, insecurity and fear factor may further deter movement at night thus complicating referral to a point of no return.[14]

As observed in the audit, out of 113237total deliveries combining all hospitals total patients who lost their life were194 with frequency of maternal deaths per lakh being 104 in Hindu Rao Hospital, 111.3 in Kasturba hospital, 111.0 in SDNH Hospital & 18.33 in GLM Hospital. The least maternal deaths in Girdhari Lal Hospital despite more number of beds and lesser number of doctors is thought provoking. There is a strong possibility of cases

being referred to other hospitals in view of the fact that there is no Blood Bank or ICU facility in the Institution, however data on referrals need to be studied to come to a definite conclusion. When reviewing institutional deliveries it could be inferred that the trend for high Maternal Mortality Rates has not changed significantly and still borders on 36 per l00,000 live births thus reflecting the importance of comprehensive health care & Institutional deliveries.

The women who became pregnant first time had highest mortality contributed to nearly seventy percent of all deaths. More than ninety five percent of maternal deaths observed had one or the other risk factors at admission which may have contributed to her mortality with Anaemia being the maximum considering only one tenth of total maternal deaths had haemoglobin above 11gm/dl and another one tenth had very low haemoglobin level which was less than 5gm/dl. It thus strongly emphasizes the urgent need for quality healthcare & door to door awareness programmes to educate the rural population regarding intense antenatal supervision, delivery by trained birth attendants in home settings and Institutional deliveries in complicated cases. The influence of emergency obstetrical referral on maternal mortality is enormous and delayed referral or care seeking has lost many a lives during resuscitation process on arrival at the hospitals.[10]

Medical audit is systemic approach to peer review of medical care in order to provide opportunities for improvement, essentially complementing and overlapping financial audit, utilization audit and management of resources. Audits are evaluator, confidential, primarily clinical and not managerial with primary focus on the process and results of medical care rather than the use of resources. It is more the responsibility of doctors than managers. It is important to conduct a Maternal Death Audit as close as possible to the death, preferably at the time of death[15] to understand the lacunae in our system as healthcare providers The need for effective emergency services in institutions, 24 hour Laboratory facilities, ICU facilities and round the clock availability of skilled consultants can save the lives of these nearly dying antenatal mothers and can go a long way in reducing Institutional Maternal Mortality Rates. The analysis of perception of women who survived and of families of women who died revealed financial issues to be the major cause for concern not only in poorest but also the lesser poor.[16] The low socio economic status has its own constraints where lack of economic power makes women dependant in decision making on her providers even for healthcare, especially where financial assistance is required.[17,18]

Ironically this Audit reflects figures of some of the premier Institutes of the National Capital of India and one is forced to wonder what a similar Audit of State & District Level Hospitals would reveal.

LIMITATIONS OF THE STUDY

- Historical data analysis from case record files depended heavily on completeness of data entry in each file.
- Data reliability was questionable as all these hospitals did not have a strong MRD (Medical Record Section) and not a very heavily trained MRD staff.
- Institutional based, Maternal Mortality cannot be extrapolated to the community.
- Disparity in facilities and trend of frequent referrals give a false mortality data.

CONCLUSION

Maternal mortality remains high even at tertiary care institutions, despite timely referral of pregnant women deserving such care. The major causes of mortality is haemorrhage, pulmonary embolism and hypertension with its associated complications including eclampsia. Lack of effective public health services, such as skilled birth attendants, round-the-clock pharmacies, availability of well equipped intensive care units and blood banks may be some of the factors contributing to this scenario. Besides, patient demographics and co-morbid illnesses (especially anaemia) seems to play a significant role in the maternal mortality. Since these inferences could be made form a death audit of hospitals, we believe that death audit is a powerful tool for identification of lacunae in the existing health care services and a potential stimulus for improvement based on reproducible data. Larger and prospective studies utilising maternal death audit is needed to effect policy changes in our country and make maternal death audit an integral and compulsory exercise in every hospital.

REFERENCES

1. K Aparna Sharma. AOGD Bulletin; April 2013.
2. Popul Stud (Camb) 2003;57: 347-366. Pubmed Extract/ Publisher Full text.
3. Zirba AK, Madise N, Mills S, Kyobutungi C and Ezeh A. Maternal mortality in the informal settlement of Nairobi city: what do we know? Reproductive Health 2009;6:6doi:10.1186/1742-4755-6-6.
4. Hiralal K and Chakraborty AB. Maternal Mortality: A FOGSI Study (Based on Institutional Data) The Journal of Obstetrics and Gynecology of India 2013; 63(2): 88-95.
5. National Rural Health Mission: frame work for implementation; 2005-2012. New Delhi: Ministry of Health & Family Welfare, Govt.of India.

6. United Nations Millennium Development Goals. www.un.org/millenniumgoals.
7. Krupp K and Madhivanan P. Leveraging human capital to reduce maternal mortality in India: enhanced public health system or public-private partnership? Human Resources for Health 2009;7:18: http://www.human-resources-health.com/content/7/1/18.
8. Somnath D, Surendra KP and Chakraborty P. Review paper – Medical Audit & Death Audit. Jr Indian Acad forensic Med 2002; 32 (4):369-370.
9. World Health organization/Unicef. Revised 1990 estimates of Maternal Mortality: A new approach by WHO & UNICEF. WHO/FRM/MSM/96.11; UNICEF/PLN/96.1; April 1996
10. Hailu S, Enqueselassie F, Berhane Y. Health facility-based maternal death audit in Tigray, Ethiopia.: Ethiopian Journal of Health Development 2009; 23 (2): 115-119.
11. World Health Organization. Maternal Mortality in 2005: estimates developed byWHO, UNICEF, UNFPA and the World Bank Geneva; WHO: 2007.
12. Hailemichael G, Maria FG, Monyo A and Johnson BR. The magnitude of abortion complications in Kenya BJOG: An International Journal of Obstetrics & Gynaecology Special Issue: Developing World Issue September 2005;112(9): 1229-1235.
13. Ronsmans C and Graham WJ. Maternal Survival Series Steering Group Maternal Mortality- who, when, where and why. Lancet 2006; 368(9542): 1189-2000.
14. Høj L, Stensballe J and Aaby P. Maternal mortality in Guinea-Bissau: the use of verbal autopsy in a multi-ethnic population. Int J Epidemiol 1999; 28:70-76.
15. Josephine K, Chris O and Isiko J. Maternal death Audit in Jinja district. Audit Report. February 2002: http://www.ugandadish.org/MaternalAuditReport.doc.
16. Kaye D, Mirembe F, Aziga F and Namulema B. Maternal mortality and associated near-misses among emergency intrapartum obstetric referrals in Mulago Hospital, Kampala, Uganda. East Afr Med J 2003; 80:144-149.
17. Wessel H, Bergstorm S, Cnattingius S, Dupre A and Reitmeier P. Evaluation of antenatal risk factors in Cape Verde. African Journal Health Science 1996; 3: 91-95.
18. Maternal mortality in India Special bulletin: Office of the Registrar General of India. New.

Authors Contribution:
MS - Concept and design of the study, Definition of Intellectual content, Literature search, Clinical studies, Data acquisition and analysis, Manuscript preparation, editing and review. **VBG -** Concept of the study, Definition of Intellectual content, Literature search, Clinical studies, Data acquisition and analysis. **RR -** Design of the study, Literature search, Clinical studies, Data acquisition and analysis, Manuscript preparation and editing. **RK -** Clinical studies, Data acquisition and Manuscript preparation. **RD -** Clinical studies and Data acquisition.**AA -** Clinical studies and Data acquisition.

Source of Support: Delhi: Ministry of Home Affairs, Govt. OfIndia. Dec 2013, **Conflict of Interest:** None declared.