



BIRTH PREPAREDNESS. DOES IT HELP IN AVERTING MATERNAL DEATHS? A POPULATION-BASED CASE-CONTROL STUDY

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ABSTRACT

Background: Several socio-cultural risk factors have been cited as risk factor for maternal death. Birth preparedness prepares the mother and her family for place of delivery, transport for delivery and save money for delivery.

Methods: This was a community based case-control study done in rural areas of Lucknow, UP (India) in a period of one year. 90 maternal deaths were identified and were matched with two controls. Data were analysed using SPSS version 17.0 and Open Epi version 2.3. Results have been given in form of Odds ratio with 95% Confidence Interval (CI)

Results: The most important direct cause of maternal death was Hemorrhage. Anaemia was the most important indirect cause of death. Families who were motivated for institutional delivery, who decided for intutional delivery and who took advice from health care givers had a protective effect against maternal death.

Conclusion: We conclude that it's the need of the hour that barring all inequities each and every mother and her family should be prepared for birth in a health and safe environment.

KEYWORDS : Case-Control Study, Birth Preparedness, Maternal Death

Introduction

The National Family health survey (NFHS)-1 (1992-93) was the first to provide the national level estimates of maternal mortality ratio (MMR) for India as 437 per 100,00 live births.¹ In the year 2013-2014 MMR of India was 167 per 100,000 live births. MMR of Uttar Pradesh, the most populated state of India, was second highest as 285 per 100,000 live births.² Though there has been a decline in maternal mortality but the pace is slow and the majority of maternal deaths continue to occur during intra-natal and 24 hours postpartum period.³

Keeping aside medical causes, there is a web of sociocultural factors which delay care-seeking and contribute to these deaths. Care-seeking is delayed because of the delay in (a) identifying the danger signs, (b) deciding to seek care, (c) timely identifying and reaching a health facility, and (d) receiving timely appropriate treatment.⁴ Birth preparedness and complication readiness (BPACR) is a strategy that prepares the pregnant mother, her family and the community to deal with emergencies, if they occur. Identification of place of safe delivery, arrangement of transport during emergency and saving money in need of emergency are the core concepts of birth preparedness.⁵ The aim of our study was to assess the difference in birth preparedness of the mother who dies and the mothers who stayed alive in the rural areas of Lucknow, Uttar Pradesh, a state with second highest MMR.²

Methods

This was a community-based case-control study conducted on 90 maternal deaths identified during the one year study. Study participants were the females (age group of 15-49 years) in the study area who either delivered and were alive after 42 days of the postpartum period or died within 42 days of termination of pregnancy in the reference period. All maternal deaths identified in all the rural blocks during the study period were enrolled through snow-balling technique. Maternal death was defined as per ICD-10 coding (Table-1).⁶

The study area was Lucknow district, capital of Uttar Pradesh. As per Census 2011, Lucknow catered a population of 4,588,455 with an average literacy rate of 79.33 Sex Ratio of 940 per 1000 males far below the national average.⁷

Each of the maternal death was matched with two controls. One was a geographical-matched control and other was complication matched control. (Table-1) All controls were drawn from the same community from where the maternal death cases were taken. Maternal deaths were identified through ASHA, and ANM. A home visit was made to the family of deceased after the suitable mourning period. Best suitable respondents were interviewed after taking informed consent. For

controls mothers, self-reported symptoms were taken and family was inquired for logistics and health seeking Data collection was done through two schedules. Verbal autopsy was conducted using UNICEF's maternal and perinatal death inquiry and response tool and was used for ascertaining the cause of maternal death. A pre-tested and semi-structured schedule was used for both cases and controls to identify birth preparedness. Questions were if they ever discussed about place of delivery during pregnancy, were they ever motivated for institutional delivery, who suggested for place of delivery, what place was suggested, and finally what they decided as place of delivery.

Data was tabulated on Microsoft Excel Sheet and analyzed by using the software SPSS, Version 17.0 and Open Epi, Version 2.3. All variables were entered as categorical. The appropriate significance test was applied using MacNemar test for paired data and unadjusted odds ratio (OR) and 95 % confidence intervals were calculated for risk factors of maternal death. p value <0.5 was considered statistically significant.

Ethical Consideration:

The study received clearance from the Ethical Board Committee of the King George's Medical University, Lucknow, UP, India. The objective, purpose of the study were explained to all the participants in their local language and written informed consent taken.

Table 1. Case and control definitions

Cases	
Inclusion Criteria	Maternal death (ICD-106 definition) is defined as death of a woman during pregnancy or within 42 days from the end of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not accidental or incidental causes ¹⁰ .
Exclusion Criteria	1. Non co-operative families 2. Mothers who died due to accidental/incidental causes 3. Late maternal deaths (ICD-106 definition: deaths due to direct or indirect obstetric causes after 42 days of termination of pregnancy but less than one year of termination of pregnancy.) 4. Maternal deaths due to rare non- pregnancy related causes (like leukaemia, burns) were not enrolled because of difficulty in finding matched controls. 5. Mothers residing in urban part of Lucknow during the study period.
Controls	

Inclusion Criteria	Geographical matched control: Defined as mother who lived in same village where a maternal death took place and had delivered normally in the same reference period without any obstetric complications (which needed urgent hospitalization) during ante-/intra-/post-natal period and was alive after 42 days of post-partum period. Random selection was done from the list of deliveries that took place in same geographical area and in same reference period using ASHAs delivery register. Complication matched control: was defined as a mother who had a similar biomedical complication (either direct obstetric causes or indirect medical causes of morbidity which needed hospitalization) and was admitted for the complication at a tertiary health centre of Lucknow such as district hospitals or medical college for management but survived and was alive after 42 days of post-partum period.
Exclusion criteria	1. Non co-operative families 2. Mothers who did not deliver in the reference period 3. Mothers residing in urban part of Lucknow during the study period.

Results

A total of 90 maternal deaths were identified during the study duration. The most common direct cause of maternal death was Hemorrhage (37, 41.1%), followed by Puerperal Sepsis (16, 17.8%). Sixteen deaths occurred due to indirect causes of maternal death. Amongst indirect causes, Anemia (14, 15.6%) was the most important cause of death. This finding is in line with the figures from India and worldwide.

For comparing birth preparedness amongst cases and controls all the deceased mothers who were in their intra-natal or post-natal period were included and compared. Mothers who died during ante-natal period and abortion related deaths were excluded from analysis as history of birth preparedness could not be elicited. Hence the sample size for comparison was less than 90.

The distribution of birth preparedness characteristics were compared amongst maternal deaths and the geographical matched controls, who were apparently healthy till 42 days of post-partum period, were compared. It was seen that person who suggested for place of delivery (friends or family Vs health care givers), the place of delivery suggested (Institutional Vs Home) and the place of delivery (Institutional Vs Home) decided by the family were the important significant factors. When family/friends suggested the place of delivery the odds of maternal death raised by two-fold (OR 1.9; 95% CI 1.2-2.9) in comparison to when healthcare giver such as ASHA, ANM or doctor gave the suggestion for place of delivery. When the place of delivery was suggested as Institution over the home delivery then the risk of maternal death reduced significantly to half-times (OR 0.5; 95% CI 0.3-0.8) thereby having a protective effect on maternal death. Similarly when the place of delivery was decided as institution then the risk of maternal death reduced by three-fifth times (OR 0.6; 95% CI 0.4-0.9) (Table-2)

Table-2 Comparison of maternal deaths with their geographical matched controls by their birth preparedness during the index pregnancy

Birth Preparedness	Sub-category	Case No. (%) N=67	Control No. (%) N=90	Unadjusted OR (95% CI)
Ever proposed for place of delivery	Yes	40(59.7)	61(67.7)	0.8(0.6-1.1)
	No	27(40.3)	29(32.2)	Reference
Was ever motivated for institutional delivery	Yes	35(52.2)	58(64.4)	0.7(0.5-1.02)
	No	32(47.8)	32(35.6)	Reference
Person who suggested for place of delivery	Family/friends	24(60)	19(31.1)	1.9(1.2-2.9)*
	Health caregivers	16(40)	42(68.9)	Reference
Suggested place of delivery	Institutional	33(82.5)	59(96.7)	0.5(0.3-0.8)*
	Home	7(17.5)	2(3.3)	Reference

Place of delivery decided	Institutional	33(82.5)	57(93.4)	0.6(0.4-0.9)*
	Home	7(17.5)	4(6.6)	Reference

***p value significant<0.5**

The distribution of birth preparedness characteristics were compared amongst maternal deaths and the complication matched controls, who developed the same complication but survived, were compared. It was seen that proposing the place of delivery during the index pregnancy by the women or her family or if they were ever motivated for Institutional delivery or the place of delivery (Institutional Vs Home) was finally decided by the family significantly influenced development of maternal death. When the family members proposed for the place of delivery during the pregnancy the odds of maternal death reduced by half (OR 0.55; 95%CI 0.4-0.8) in comparison to when family never discussed for the place of delivery. Similarly when the family members were motivated for the institutional delivery then again the risk of having maternal death reduced by half (OR 0.5; 95 % CI 0.3-0.7). When the place of delivery was decided as institution then the risk of maternal death reduced by three-fifth times (OR 0.6 ; 95% CI0.4-0.95) (Table-3)

Table-3 Comparison of maternal deaths with their complication matched controls by their birth preparedness during the index pregnancy

Birth Preparedness	Sub-category	Case No. (%) N=66	Control No. (%) N=61	Unadjusted OR (95% CI)
Ever proposed for place of delivery	Yes	40(60.6)	56(91.8)	0.55(0.4-0.8)*
	No	26(39.4)	5(8.2)	Reference
Was ever motivated for institutional delivery	Yes	39(59.1)	57(93.4)	0.5(0.3-0.7)*
	No	27(40.9)	4(6.6)	Reference
Person who suggested for place of delivery	Family/friends	23(57.5)	25(44.6)	1.3(0.9-1.9)
	Health caregivers	17(42.5)	31(55.4)	Reference
Suggested place of delivery	Institutional	33(82.5)	49(87.5)	0.7(0.5-1.1)
	Home	7(17.5)	7(12.5)	Reference
Place of delivery decided	Institutional	33(82.5)	52(92.9)	0.6(0.4-0.95)*
	Home	7(17.5)	4(7.1)	Reference

p value significant<0.5

Discussion

In the present study the majority of maternal deaths were due to direct causes amongst which obstetric hemorrhage was the most important cause of death. Amongst the indirect causes Anemia was the most important cause of death. This finding is in line with the figures from India and worldwide.8,9 It was observed that families who were motivated for institutional delivery and decided for the institutional delivery were more likely to survive even when they developed complication. This finding suggests that these families may have prepared themselves for birth and emergency.

Birth preparedness improves chances of mother seeking health care during especially during obstetric emergency. Studies from Nepal and India also support this finding. 10-13 It was also observed that when the mother and families were motivated by health care givers instead of family and friends and when they were specifically suggested for institutional delivery they are more likely to utilize maternal health care during the pregnancy thus may have lesser chances to develop any complications and deliver in a healthy safe environment. The study from Nepal suggests the predominant role of family specially husband and mother in law in decision making of safe delivery of women. 14

Obstetric complications are inevitable and cannot be predicted, still good quality antenatal care and ensuring birth preparedness during antenatal care appeared to strongly influence women's use of skilled care during delivery and thus the women who even develop complications have better chances to survive. 15

Conclusion

We conclude that birth prepared has a critical role in determining maternal death. Mothers and their family when positively prepare for the pregnancy in terms of place of delivery, transport and finance for delivery and emergency can save so many lives of mothers and newborns. It's the need of the hour that barring all inequities each and every mother and her family should be prepared for birth in a health and safe environment.

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References

1. Bhat PN. Maternal mortality in India: an update. *Studies in Family Planning*. 2002 Sep 1;33(3):227-36.
2. Sample Registration System. Maternal Mortality Ratio Bulletin 2011-13. Available from http://www.censusindia.gov.in/2011common/Sample_Registration_System.html [Accessed on 15.3.2018]
3. Ronsmans C, Graham WJ, Lancet Maternal Survival Series Steering Group. Maternal mortality: who, when, where, and why. *Lancet*. 2006;368:1189-200.
4. Thaddeus S, Maine D. Too far to walk: maternal mortality in context. *Soc Sci Med*. 1994;38:1091-110.
5. Maternal and Neonatal Health Program. Birth preparedness and complication readiness: a matrix of shared responsibilities. Baltimore, MD: JHPIEGO; 2001. p. 12.
6. International classification of disease (ICD). World Health Organization; Available from <http://www.who.int/classifications/icd/en/index.htm>. [Accessed on 2012/May/14]
7. Lucknow district: Census 2011 data. Available from: <https://www.census2011.co.in/census/district/528-lucknow.htm> [Accessed on 2012/September/24]
8. Khan KS, Wojdyla D, Say L, Gülmezoglu AM, Van Look PF. WHO analysis of causes of maternal death: a systematic review. *The Lancet*. 2006 Apr 1;367(9516):1066-74.
9. Mills S, Bos E, Lule E, Ramana GNV, Bulatao R (2007) Obstetric care in poor settings in Ghana, India and Kenya: an HNP discussion paper. Washington D.C.: The World Bank.
10. McPherson RA, Khadka N, Moore JM, Sharma M. Are birth-preparedness programmes effective? Results from a field trial in Siraha district, Nepal. *J Health Popul Nutr*. 2006;24:479-88
11. Fullerton JT, Killian R, Gass PM. Outcomes of a community- and home-based intervention for safe motherhood and newborn care. *Health Care Women Int*. 2005;26:561-76.
12. Kumar V, Mohanty S, Kumar A, Mishra RP, Santosham M, Baqui AH, et al. Effect of community-based behaviour change management on neonatal mortality: a cluster-randomized controlled trial in Shivgarh, Uttar Pradesh, India. *Lancet*. 2008;372:1151-62.
13. Agarwal S, Sethi V, Srivastava K, Jha PK, Baqui AH. Birth preparedness and complication readiness among slum women in Indore city, India. *Journal of health, population, and nutrition*. 2010 Aug;28(4):383.
14. B, Porter MA, Van Teijlingen ER. The role of mothers-in-law in antenatal care decision-making in Nepal: a qualitative study. *BMC pregnancy and childbirth*. 2010 Dec;10(1):34.
15. Abebe F, Berhane Y, Girma B. Factors associated with home delivery in Bahirdar, Ethiopia: a case control study. *BMC research notes*. 2012 Dec;5(1):653.