# Identifying factors associated with maternal deaths in Jharkhand, India: A verbal autopsy study

Authors

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## INTRODUCTION

Maternal mortality, which reflects the socio-cultural and economic disadvantages that women experience, has been identified as a priority on health policy and research in India. The Child Survival and Safe Motherhood Program (1992), Reproductive and Child Health Program (1997), National Population Policy (2000), and National Rural Health Mission (2005-12) consistently reiterate the government's commitment to safe motherhood. India's maternal mortality ratio (MMR) stood at 570 in 1990, which fell to 470 per 100, 000 live births in 1995, 390 in 2000, 280 in 2005 and 230 in 2008 (WHO et al. 2010). India with an annual decrease of MMR by 4.9 percent since 1990 now records 63000 maternal deaths a year; tops the list of countries with maternal mortality. Despite 59 percent drop in MMR since 1990, the country is far from achieving the national socio-demographic goal of reducing MMR to below 100 by 2010 (NPP, 2000) or MDG goal of 75 percent reduction by 2015 (UN, 2000). Widespread regional variation besides higher concentration of maternal mortality in specific social groups (religion, caste or tribe) has also been evident from past studies (RGI, 2009, Das et al. 2006 and Bhat, 2002). Hemorrhage has been found to be the major reason of maternal deaths in India (Agarwal et al. 2007; Mills et al. 2007; RGI, 2006; Chhabra and Sirohi, 2004 and ICMR, 2003). Other important determinants found are Sepsis, Post abortion complications, and Obstructed labor. Again, the decision delay, travel delay and treatment delay independently or in combination contribute to maternal mortality in the country (Mills et al. 2007).

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Jharkhand, the 28th State of India spreads across 79,714 square kilometers in eastern India, comprises 32,615 villages and 152 towns (GOI, 2009). Out of the 26.9 million population, 78 percent are rural inhabitants; 26 percent belongs to scheduled tribe[3]; 12 percent to scheduled caste[4] category (RGI, 2001). Female literacy is particularly low in the state as only 39 percent of females are literate, which is again lower in rural areas (30 percent). NFHS-III (IIPS and Macro International, 2007) reveals that more than half of the households in Jharkhand (52 percent) fall in the lowest wealth quintile, while only one-third of the households fall in the top 3 quintiles. Sixty-three percent of women age 20-24 years got married before the legal minimum age of 18 years. Total Fertility rate is 3.3 children; and among women aged 15-19, more than one-quarter (28 percent) have already begun childbearing. The median interval between births is 32 months. Less than one-third (31 percent) of the currently married women aged 15-49 are using any modern contraceptive method while about a quarter (23 percent) have an unmet need for contraception.

Among mothers who gave birth in the five years preceding the survey, 57 percent received antenatal care from a health professional and only one-third of them received antenatal care during the first trimester of pregnancy. Four out of every five births in Jharkhand take place at home. Only 17 percent of mothers had a postnatal check-up within 2 days of birth, as is recommended; most women receive no postnatal care at all. About two-fifths (43 percent) of the adult women are underweight and 70 percent of women have anemia. Again, merely 12 percent of the women decide alone about their own healthcare. Above all, the MMR of the state is 312, much ahead of the national average of 254 (RGI, 2009). Moreover, higher illiteracy, poor economic status, political instability forcing ineffective implementation of policies, poor health infrastructure and a population that is known for strict adherence to traditional beliefs and norms makes the state a perfect case to carryout the study ascertaining the magnitude and attributes of maternal deaths. Specifically, the objectives are to (1) Understand the missed opportunities for interventions to save maternal lives; (2) Explore social dimensions contributing to maternal mortality; and (3) Support the government and other agencies to develop need based area specific strategies to address these issues.

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[3] Article 342 of the Constitution of India provides that the President may with respect to any State or Union territory, and where it is a State, after consultation with the Governor thereof, by public notification, specify the tribes or tribal communities or parts of or groups within tribes or tribal communities which shall for the purposes of this Constitution be deemed to be Scheduled Tribes in relation to that State or Union territory, as the case may be.

[4] Article 341 of the Constitution of India provides that the President may, with respect to any State or Union territory, specify the castes, races or tribes or parts of or groups within castes, races or tribes which shall for the purposes of the Constitution be deemed to be Scheduled Castes in relation to that State or Union territory. In other words Scheduled castes are Indian population groupings that are explicitly recognized by the Constitution of India, previously called the depressed classes, and otherwise known as untouchables.

## MATERIALS & METHODS

A cross-sectional study was carried out in the year 2008 in two phases: house listing of all the villages to enumerate the number of maternal deaths in the study area during the reference period (2004 -2007), which was followed by selection of a representative sample for verbal autopsy from the maternal deaths, occurred during one year preceding the survey (2006-07). A multistage sampling design was followed to choose the deaths for verbal autopsy. At first, five districts i.e. Palamau, West Singhbhum, Giridih, Godda and Gumla representing five divisions[5] of the state were selected using simple random sampling. Secondly, three blocks from each district were selected using systematic random sampling. Thirdly, maternal deaths occurred during last one year prior to the study were considered for verbal autopsy. In all, 4154 maternal deaths were recorded during the reference period (2004-07) in the five districts. The verbal autopsies of maternal deaths were designed to provide interventions lead to maternal deaths besides understanding the causes of maternal death. In order to attain these objectives, a sample size[*] of 470 maternal deaths out of 883 maternal deaths in last year prior to the survey date (2006-07) was fixed for verbal autopsy, depending upon time and resource constraints. Sample allocation was done using the Probability Proportional to Population Size (PPS) methodology from selected blocks of respective districts.

The verbal autopsy tool was designed to collect information from the sample households where the maternal deaths occurred. The verbal autopsy tool comprises six sections. The first section collects the background information of the deceased. The second section contains a brief history of the female's illness that led to death. The third section collects general information about events preceding the deaths. Information regarding general illness leading to death and specific questions on symptoms and signs of the last illness are asked in the fourth section. The fifth section covers maternal deaths during pregnancy, abortion, within six weeks after delivery or abortion. Information regarding treatment and care seeking behavior of deceased child is covered in the fifth section. Additional information in terms of rituals performed by the communities during pregnancy, childbirth and after delivery is included in the last section. Information on maternal deaths was gathered successfully from 417 cases through verbal autopsy technique. Out of 417 verbal autopsy cases, 403 were identified as maternal deaths while 14 cases were accidental deaths.

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[5] A group of districts put together on the basis of their geographical location for planning and administrative purposes

[*]A separate sample for maternal deaths has been drawn using minimum sample size criteria as well as using survey design effect. Based on 95 percent confidence interval, proportion in the population 0.5 (for maximum variability), alpha 5 percent (two sided) and power of 80 percent, the minimum sample size for maternal deaths after applying finite population (total deaths in last one year) correction factor comes to be 346, assuming random sample procedures. Since the sampling design is two staged, therefore, a design effect of 1.25 is assumed and allowing for a 10 percent of non response cases for administering the detailed maternal questionnaire, the minimum targeted sample for maternal deaths segment turns out to be 470.

Informed consent of the respondents was taken into consideration before verbal autopsy. The analytical approach includes bivariate analysis through SPSS besides triangulation of both qualitative and quantitative findings. Moreover, to derive the MMR, live births have been projected from Census 2001 data for the same periods. It is worth mentioning that the study follows the WHO definition of maternal mortality i.e. the death of a woman while pregnant or within 42 days of termination 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.

## RESULTS

### Maternal mortality ratio

Table 1 shows district wise and overall MMR (with 95 percent CI) by time period. The overall MMR in last three years preceding the survey, has reduced from 527/100000 to 376/100000 live births. Nevertheless, maternal mortality remains high in the state which calls for focused attention to overcome this challenge. The reduction in MMR is observed less in Gumla and West Singhbhum as compared to other districts over the time.

### Context of deceased women

The data in table 2 provides detailed socio-economic and demographic characteristics of the deceased women. On average, the women who died were 27 years old. Eighty-five percent of the deceased had no education. Majorities of the deceased (74 percent) were housewives and 16 percent were working in agricultural sector. On average, the deceased experienced three pregnancies and the average parity was 2.8. These women's deaths left an average of two children motherless at home. Poverty may be one of the leading factors contributing to maternal deaths in the state; most (89 percent) of the deceased were living in house made with low quality material. Moreover, the mean household size was 6.3 and monthly household income was $35.

Table 3 presents selected characteristics pertaining to maternal healthcare prior to the women's death. Seventy-two percent of the women did not receive any antenatal care in the pregnancy that ended in their deaths. Only 28 percent of the deceased received at least one antenatal care which includes seven percent of cases where deceased did no remember about number of visits. Merely 16 percent of the deceased given birth in health facility. A physician provided care during delivery for only 13 percent of the cases, while midwife were in charge for six percent of the deliveries and a large majority of the deliveries (80 percent) were attended by 'others' during birth.

Place of death was a hospital for less than one-fifth (19 percent) of the deceased in the sample, while the rest died either in their own home or on their way to hospital. A majority of

the women (45 percent) died within six weeks of delivery/abortion, while 28 percent of the women died during pregnancy period, another 26 percent died around the time of delivery, and rest died during abortion.

**Factors associated with maternal death**

Maternal death mainly is attributed to a host of medical factors, which are often directly or indirectly influenced by various socio-demographic, economic and cultural factors. The complex nature of maternal complications often misunderstood/ignored due to inadequate knowledge and aggravated by various socio-cultural factors in the state is presented below.

**A. Deaths immediately after onset of complication**
Life-threatening obstetric complications can occur without any warning signs and immediately lead to maternal deaths.

> *Case1: 26 year old Illiterate Scheduled Tribe woman with 5 live births: The delivery was normal. She along with her husband went to her natal family after 8 days. Family members offered her fish curry which was prepared in their home that day. She did not have the meal and told that she is feeling discomfort in her stomach. She tried to breastfeed her baby but could not. Before her family members could understand anything, she died. This area is a very backward tribal dominated area and hardly receives the health services provided by the government.*

Her pregnancy was uneventful, so she and her family did not seek a health professional's assistance during delivery. She had had five previous births but the family was unaware of her risk of maternal death. Had she been delivered by a health professional, she would have been closely monitored and perhaps survived. Families need to know that even normal deliveries are at risk of causing maternal death.

**B. Delays that resulted in maternal deaths**
Verbal autopsy reports of the total maternal deaths were examined to illustrate the delays in obtaining appropriate emergency obstetric care. Of the 403 maternal deaths, narratives of family members indicate that in three-fourths of the deaths, delays were responsible for death. The major types of delays that subsequently resulted into maternal deaths were delay in decision about treatment seeking after recognition of the complications, delay due to means of transport/road connectivity to the health facility, and the delay in receiving the actual treatment after reaching the health facility or number of facility visited. Table 4 provides the information on delays in search for, access to and provision of adequate care.

**Decision delay**
The first delay refers to the delay in recognizing emergency obstetric complications and making a prompt decision to seek care. This is particularly important in cases such as

postpartum hemorrhage, which can lead to maternal death within hours. The data reveals that in about two-thirds of the cases (65 percent), it has taken 2-7 days while in another quarter of cases more than a week to recognize the complications that led to subsequent deaths. Out of those cases where the complications were recognized, only 64 percent had decided to seek care. Moreover, only 28 percent of those who had decided to go for treatment had decided to seek treatment from a health facility. The data further reveals that in almost two-thirds of the cases, the time elapsed between realizing a complication and seeking for help is more than one complete day.

> *Case2: 30-year old Illiterate Scheduled Caste woman with 3 live births: She delivered to a live birth. Before delivery she wasn't having any complication except mild fever. The baby died after a few hours of delivery as it was delivered pre-term and was a case of complicated delivery. The woman was continuously loosing blood and became very weak. She wasn't taken for treatment in any health facility rather was treated by the Dai, who treated her with some traditional roots besides providing external warmth to the stomach. She died on 10<sup>th</sup> day after delivery before the family members could decide about taking her to a hospital.*

This case depicts the delay in recognition of the obstructive complications followed by further delay in decision to seek treatment from health facility. Although the deceased was suffering from fever before delivery and delivered to a pre-term baby, she was not given any post delivery check-up. To make the situation worse, her hemorrhage was treated by an untrained Dai with traditional herbs that finally led to her death. Institutional delivery or timely treatment by a trained health care provider could have saved the deceased.

**Travel delay**
The second delay refers to getting to the health facility after the decision is made to seek care. Usually this is due to the long distance to health facilities, difficulty in getting transport, and associated cost. Seventy percent of the cases took 1-2 hours to search a transport facility while 23 percent of the cases could arrange the transport in 2-5 hours and eight percent took 5 hours or more. Time elapsed to reach hospital/clinic took 2-5 hours in 41 percent of the cases while 17 percent took 5 hours or more.

> *Case3: 30-year old Illiterate OBC woman with 5 live births: There was no problem during pregnancy. Convulsion started after eight days of delivery. She used to experience severe stomach pain. She was unable to urinate from the last night and also had problem in opening the mouth. She became unconscious that night only. However, she was taken to Hospital in a Bullock Cart the next morning. She died on the way to hospital.*

The case shows the poor transportation facility in the state. In spite of delayed decision to seek treatment owing to inadequate awareness of the complications, she could have been

saved by reaching the health facility bit early by using any modern means of transport rather than wasting time in the bullock cart.

**Treatment delay**

The third delay pertains to receiving appropriate treatment when the woman gets to the health facility. A majority of the cases (47 percent) received treatment immediately or within 30 minutes and another 28 percent of the cases were treated within 30-59 minutes and rest took more than an hour to start treatment. However, even though women sought and received immediate treatment, the treatment was substandard as mentioned by family members. Arrival at the health facility does not ensure that a woman will receive treatment necessary to save her life. Data reveals that 37 percent of the cases went to a facility where the required care was not available. They then decided to go or were referred to another facility, with substantial delay resulting deaths.

> *Case4: 40- year-old Illiterate OBC woman with six live births: She had completed nine months of her pregnancy. When labor pain started then we took her to primary health centre. Doctor treated her with glucose bottle and given injections. After two hours, the doctor told that the child had died in womb and he can not handle the situation. He suggested taking her to other hospital. Then we proceed to Daltonganj city for further treatment but on the way she died. If PHC doctor would have told us earlier then we could save her life in other hospital.*

The case reveals the poor preparedness of the primary health centers to address basic obstructive complications. Timely and appropriate diagnosis by the doctor would have definitely saved her life.

**Multiple delays**

More often than not, multiple phases of delay lead to maternal deaths indicating the entire health system has to function in order to reduce maternal morbidity and mortality. The following case highlights the essence of a functioning health system.

> *Case5: 20- year-old Illiterate Scheduled Tribe woman with first pregnancy: She experienced labor pain at around 4 PM. The family members called the traditional Dai. The delivery took place at 7 PM. Both the mother and child were cleaned after placenta came out. During that time only, the deceased experienced fits. Her hands and legs were shivering like a chicken and her body curved like an arrow. She even vomited watery things once. Foam started coming out from her mouth. She spent the entire night like that and by morning she was unconscious. At 7 AM in the morning, she was taken to Dr X (local doctor often without proper degree) at Pirtand in a Jeep. As she was still unconscious, she was administered glucose water. After sometime, the doctor told the family that it is not possible to treat the deceased at his place and suggested the family to take her to district hospital. Then the family members took the deceased to her natal home, which was nearby; so as to make arrangement for going to district hospital. During the arrangement only she died.*

This case depicts how the phases of delay are interconnected. In spite of her first pregnancy, the family members did not feel the need for institutional delivery. There was delay in deciding to seek treatment during the night. Again, the family members took her to a local doctor rather than a hospital thus loosing valuable time to save her. Again, the local doctor wasted precious time by attempting to treat her without diagnosing the severity of her complication. It was compounded further by the delay in arrangement to take her to the hospital as suggested by the local doctor. To avert some of these maternal deaths, women and their families have to be aware of maternal complications and its consequences.

## C. Adherence to traditional rituals and superstition
The state is known for its adherence to traditional practices and belief system. However, some of these existing practices lack scientific logic and often adversely affect the maternal health. Findings suggest that many a time women are discouraged to have much food during pregnancy; disallowed to cremation grounds but not barred from consuming locally available alcohol. Again, delivering the baby with the help of relatives or at most by Dai is quite common. Moreover, Dai's treatment is sought incase of any post delivery complication.

*Case6: 26 year old Illiterate Scheduled Tribe woman with 5 live births: In our community we generally discourage pregnant women to have much food. Slight amount of country made liquor (Handia) is given to pregnant women in case of pain.*

*Case7: 37-year old Illiterate OBC woman with 6 live births: When the deceased was in her 6th month of pregnancy, she went to her natal home to have Prasad (Food items consumed after dedicating it to God. It may be fruits or cooked grains/cereals). After returning she behaved abnormally. She used to complain that somebody (Ghost) who is sitting in the nearby tree has come to take her and she will be going with him. The family members called the neighboring village's priest (Jhad Phhok Bala) to protect her from Ghost. She was ok for some days and then again complained about headache and non-interest in food. The neighboring doctor who visited her told that she is anemic and gave her some medicine. During delivery when she experienced more pain, Dai was called. Dai told that the baby is in a wrong position and massaged her stomach to deliver the baby. The day after delivery, she felt breathlessness along with severe body pain. The same doctor from the neighborhood was called and he viewed that the lady is having stomach pain due to massage during delivery and gave some medicine. But the pain continued and she died. Her urine color was like mustard oil by that time.*

## D. Unsafe abortion
Unsafe abortion has been found as an important determinants causing maternal death. The study reveals that many people are not aware about legality of abortion in the country. Again, many are not only unaware about the consequences of unsafe abortion but also lack

knowledge about the facility providing safe abortion. The following case shows the ignorance led abortion attempt resulting into maternal death.

> *Case 8: 25-year old illiterate OBC woman with 1 live birth: As her husband was not interested for another baby in a short interval; he brought some medicine and feed her during second month of her pregnancy. One week after taking the medicine, one day after taking bath she told that she is feeling uneasy and lied down. When her condition started worsening, her husband took her to Sadar Hospital. By that time she had loosed much blood. She died in between treatment.*

**E. Poverty**

Poverty is widespread in the state and many a times hinders the treatment seeking of any maternal health complications. The following case reveals the plight of a husband who could not seek proper treatment for her wife due to financial constraints.

> *Case9: 25 year old Illiterate Scheduled Tribe woman with 8 live births: After delivery she suffered from itching in the whole body. When she was pregnant she was suffering from fever along with cough and cold. She had night blindness during pregnancy. Moreover, there was scarcity of food in the home. We did not have money for her treatment, still then I took some load from the Moneylender (Mahajan) and treated her in the nearby facility of a local doctor(quack).I could not think of taking her to outside hospital due to financial problem. She died like that.*

**F. Poor health infrastructure**

The respondents at large perceive the available health facilities are inadequate, inaccessible, without required staffs and above all are providing poor quality of services. The following case shows the possible incapacity of the doctor to diagnoses the real disease that could have saved one precious life.

> *Case10: 30-year old Illiterate Scheduled tribe woman with 5 live births: When she was in her third month of pregnancy, she suffered from cold and fever. She was treated by the village quack for fifteen days but in vain. She became very weak and thus was admitted in the Sadar Hospital. The doctor started treatment but could not cure her fever. Her condition did not improve even after spending 15 days in the hospital and she died in the hospital.*

**DISCUSSION**

The medical and socioeconomic factors leading to maternal mortality are largely preventable. Nevertheless it remains a major public health challenge in the state. The MMR in the state is much higher than the national figure questioning the implementation of national rural health mission (NRHM) and state specific policies/programs targeting maternal health. The study

finds that most of the deceased were poor; non-literates; and housewives indicating certain section of the society are more prone to maternal mortality. This validates the results from past studies (RGI, 2009; Agarwal et al. 2007; Das et al. 2006 and Bhat, 2002). Reducing maternal mortality in Jharkhand would entail a multi-pronged approach. Provision of quality obstetric care besides better health infrastructure (physical as human resources) and capacity building of health workforce seems pertinent. Moreover, behavior change communication programs targeting community mobilization to use obstetric care and addressing awareness generation towards maternal complications are equally important.

**Provision of quality obstetric care**

The study came out with the fact that the utilization of maternal health care services is remarkably low in the state that often leads to maternal complications and subsequent deaths. As from verbal autopsy sample, 7 out of every 10 deceased women did not receive any antenatal care that ended in their deaths. The poor utilization of antenatal care services has also been indicated by a series of national family health surveys conducted in 1998-99 and 2005-06 in the state. The findings from NFHS-III show that only 36 percent of women received at least three ante-natal care visits and hardly one-third of the mothers received antenatal care in first trimmest of their pregnancy.

In terms of delivery care, findings also reveal that merely 16 percent of the deliveries are institutional, the rest are carried out at home or in unsanitary conditions. Only five percentage point increased in institutional delivery in seven years time indicate the performance of reproductive and child health programs in the state in not up to the mark. In addition to that only 29 percent of the deliveries have been attended by health professionals in the state which is again much lower in rural areas (21 percent) compared to urban areas (62 percent). Poor institutional deliveries have also been revealed from verbal autopsy sample as only 17 percent of the deceased given birth in health facility and 20 percent deliveries were assisted by health professionals. This may be because of the shortfall of gynecologist/obstetricians in the state.

Moreover, current use of any family planning method in the state is 36 percent, showing an increase of 29 percent from 1998-99 to 2005-06. Since female sterilization accounts for 66 percent of family planning use but the performance pace has down as it was accounted 76 percent in 1998-99. Unmet need for family planning in the state is 23 percent. Surprisingly, unmet need for family planning has increased by two percentage point since 1998-99 to 2005-06. Hence poor performance of family planning leads to unintended births which may lead to maternal deaths in the state. Further, within the state itself, the health indicators of groups which face severe social exclusion and denial of rights and entitlement on account of caste, class and sex is even lower. With almost 40 percent of the population of the state comprising of ST (28 percent) and SC (12 percent), social exclusion is high for these groups leading to overall low health indicators. Poor awareness and utilization of the maternal health

care services urges the need for reinforcement of home visits by the grass root level health care providers.

An efficient blood transfusion service in the state would help to address the predominant cause of maternal mortality (postpartum hemorrhage). Antenatal care presents an opportunity for early detection and treatment of anemia in pregnancy. The haemocue hemoglobinometer could be an option at outreach centers, sub-centers, and PHCs without laboratory technicians. Additionally, culturally appropriate nutritional counseling should be provided during antenatal care. Adequate training of physicians and equipping all primary health centers, FRUs and district hospitals in the provision of comprehensive post-abortion care including family planning would address the high burden of abortion complications. Health specialists (gynecologists/obstetricians) should be deployed in round the clock PHCs and FRUs. Stockouts of drugs at government health facilities was a major concern in the communities. Partograph training for staff should be encouraged in medical colleges and nursing schools until cardiotocographs become widely available in the state. Obstetric record keeping should be improved to monitor the performance of health facilities.

**Health systems strengthening and capacity building of health workforce**
As reported by the respondents and corroborated by the available government statistics, the health infrastructure especially those associated with maternal health care are far from satisfactory. The Primary Health Centres (PHCs), which provide the basic emergency obstetric care in the community, has a short fall of 60 percent. To make the situation worse there is 22 percent shortfall in required number of sub-centres (SCs), which works as a catalyst in terms of awareness generation along with provision of basic maternal health care services. Shortfall of health specialist in existing health facilities is another problem in the state where obstetrician-gynecologist presence is negligible. Data from Community Health Centres (CHCs) reveals a shortfall of 91 percent in number of Obstetricians & Gynecologists (GOI, 2009). Additionally, an assessment of the round the clock health facilities in the state reveals that none of the CHCs, Block PHCs and PHCs was equipped with round the clock emergency services (Constella Futures, 2008). Moreover, verbal autopsies states that the private hospitals and private nursing homes were more capable of providing emergency obstetric care compared with the government health facilities. The above discussed figures not only suggest the need for health systems strengthening to deliver high-quality services particularly in underserved communities but also Health workforce capacity building by implementing national plans to train, retain and deploy health workers. Public Private Partnership in service delivery especially in hard to reach areas would yield dividend in terms of higher service utilization. Moreover, untrained 'dais' should be trained to recognize the obstetric complications at an early stage and refer high-risk cases for adequate management.

**Avoiding the delays in decision, travel and treatment**
The delays that have found to be the major reasons of maternal mortality in the state may be attributed to many things; inadequate awareness of maternal complications being the main.

Information, Education and Communication (IEC) activities targeting behavior change in the community towards importance of maternal health and negative consequences of traditional practices unfavorably affecting maternal health would definitely work towards saving precious maternal lives.

**Community mobilization to use obstetric care**

Low institutional delivery reflects lack of or poor access to health facility/personnel subsequently leading to inadequate utilization of maternal health care services. Moreover the fact that considerable percent of women are dying because of pregnancy or delivery complication that to mostly in home, points finger at the poor quality of delivery and emergency obstetric services in the community besides no/inadequate awareness about complications leading to maternal deaths. The poor utilization of obstetric care services and its correlates urges multifaceted communication campaign to encourage professional delivery care. Educating women and their families about the benefits of professional delivery assistance should be a long-term commitment given the prevailing entrenched perceptions and attitudes regarding home delivery.

In short, government must renew and reinvigorate efforts to eliminate these preventable causes of maternal mortality for the betterment of the society in general and women in particular.

## ACKNOWLEDGEMENT

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| Table 1: Maternal mortality ratios by districts | | | | | | |
|---|---|---|---|---|---|---|
| | **2004-05** | | **2005-06** | | **2006-07** | |
| District | MMR | Lower-upper confidence limits | MMR | Lower-upper confidence limits | MMR | Lower-upper confidence limits |
| Gumla | 597 | 434 – 760 | 537 | 371 – 698 | 474 | 324 – 624 |
| W. Singhbhum | 398 | 264 – 533 | 316 | 207 – 424 | 286 | 193 – 379 |
| Giridih | 637 | 468 – 809 | 534 | 408 – 659 | 433 | 319 – 547 |
| Palamau | 635 | 368 – 900 | 521 | 319 – 722 | 444 | 302 – 585 |
| Godda | 378 | 249 – 507 | 311 | 200 – 422 | 242 | 151 – 333 |
| **Total** | **527** | **448 – 607** | **440** | **374 – 505** | **376** | **322 – 429** |

**Note:** To estimate the MMR, live births have projected for the reference period using the Census 2001 data

| Table 2: Socio-demographic characteristics of women who died due to maternal causes | |
|---|---|
| **Characteristics** | **Statistics (Number)** |
| **Age (years)** | |
| Average, S.D. | 27, 6.8 (403) |
| **Educational level[1] (%)** | |
| No education | 84.9 (342) |
| Up to primary | 5.0 (20) |
| Up to secondary | 5.2 (21) |
| Up to High school | 4.5 (18) |
| Higher secondary or above | 0.5 (2) |
| **Occupation (%)** | |
| Housewife | 74.4 (300) |
| Working in agriculture sector | 16.1 (65) |
| Working in non-agriculture sector | 9.4 (38) |
| **Reproductive history** | |
| Pregnancies (mean, S.D.) | 3.1, 2.1 (403) |
| Children ever born (mean, S.D.) | 2.8, 2.2 (403) |
| Children surviving (mean, S.D.) | 1.9, 1.9 (403) |
| **Type of house (%)** | |
| Low quality material | 88.8 (358) |
| Medium quality material | 8.4 (34) |
| High quality material | 2.8 (11) |
| **Household monthly income (in Rs)** | |
| Average, S.D. | 1614, 1084 (403) |
| **Mean household size** | 6.3 |

[1]Upto primary means 0-5 completed years of education; up to secondary means 6-8 completed years of education; up to high school means 9-10 completed years of education and higher secondary and above means 11 or more completed years of education

| Table 3: Reproductive health care of women who died of maternal causes | |
|---|---|
| **Characteristics** | **Percent (Number)** |
| **Antenatal care for this pregnancy** | |
| None | 72.0 (290) |
| One | 3.0 (12) |
| Two | 9.4 (38) |
| Three or more | 8.4 (34) |
| Don't know | 7.2 (29) |
| **Institutional delivery*** | 16.2 (47) |
| **Personnel at delivery*** | |
| Doctor | 13.4 (39) |
| Midwife | 6.2 (18) |
| Other (*dai, relatives etc.*) | 80.4 (234) |
| **Place of death** | |
| Home/community | 80.9 (326) |
| Hospital | 19.1 (77) |
| **Timing of death** | |
| During pregnancy | 27.5(111) |
| During delivery | 25.6(103) |
| During abortion | 1.5(6) |
| Within six weeks of delivery/abortion | 45.4(183) |
| *Based on cases who experienced natal care | |

| Table 4: Delays in the search for, access to and provision of adequate care | |
|---|---|
| **Characteristics** | **Percent (Number)** |
| **DECISION DELAY** | |
| **Time required to recognize complication[1]** | |
|   1 day | 5.8 (16) |
|   2-7 days | 65.3 (181) |
|   8 days or more | 25.3 (70) |
|   Never detected | 3.6 (10) |
| **Decision to seek help[1]** | 64.0 (267) |
| **Decision to seek help in hospital/clinic[2]** | 28.3 (118) |
| **Time elapsed between realizing there is a complication and seeking for help[1]** | |
|   Within one day | 34.2 (91) |
|   1-3 days | 39.4 (105) |
|   4 or more days | 26.5 (73) |
| **TRAVEL DELAY** | |
| **Time elapsed for arranging the transport[3]** | |
|   < 1 hour | 38.9 (61) |
|   1-2 hours | 30.6 (48) |
|   2-5 hours | 22.9 (36) |
|   5 hours or more | 7.6 (12) |
| **Time elapsed to reach hospital/clinic[3]** | |
|   < 1 hour | 20.4 (32) |
|   1-2 hours | 22.3 (35) |
|   2-5 hours | 40.8 (64) |
|   5 hours or more | 16.6 (26) |
| **TREATMENT DELAY** | |
| **Waiting time for care provision[3]** | |
|   Immediately/within 30 minutes | 46.5 (73) |
|   30-60 minutes | 28.0 (44) |
|   1-4 hours | 17.8 (28) |
|   5 hours or more | 7.6 (12) |
| **Number of facilities visited[3]** | |
|   1 | 63.1 (99) |
|   2 | 31.2 (49) |
|   3 or more | 5.7 (9) |

[1] Based on cases who experienced any pregnancy complication
[1] Based on cases who sought treatment for any pregnancy complication
[3] Among those who sought care in hospital/clinic

| Annexure 1: Health infrastructure | | | |
|---|---|---|---|
| **Particulars** | **Required** | **In position** | **Shortfall** |
| Sub-centre | 5057 | 3947 | 1110 |
| Primary Health Centre | 806 | 321 | 485 |
| Community Health Centre | 201 | 194 | 7 |
| Multipurpose worker (Female)/ANM at Sub Centres and PHCs | 4268 | 6435 | * |
| Health Worker (Male) MPW(M) at Sub Centres | 3947 | 1922 | 2025 |
| Health Assistant (Female)/LHV at PHCs | 330 | NA | NA |
| Health Assistant (Male) at PHCs | 330 | 660 | * |
| Doctor at PHCs | 330 | 330 | 0 |
| Obstetricians & Gynaecologists at CHCs | 194 | 17 | 177 |
| Physicians at CHCs | 194 | 64 | 134 |
| Total specialists at CHCs | 776 | 341 | 435 |
| Radiographers | 194 | 15 | 179 |
| Pharmacist | 515 | 348 | 167 |
| Laboratory Technicians | 515 | 381 | 134 |
| Nurse/Midwife | 1679 | 429 | 1250 |
| Source: RHS Bulletin, March 2009, MOHFW, GOI<br>*Surplus, NA-Not available | | | |

| Annexure 2: Changes in maternal health indicators between 1998-99 and 2005-06 | | | |
|---|---|---|---|
| **Indicator** | **1998-99** | **2005-06** | **% change** |
| Women with no education | 61.4 | 58.5 | 4.7 (-) |
| Women receiving any antenatal care (%) | 42.0 | 60.7 | 44.5 (+) |
| Women receiving at least three antenatal care visits (%) | 24.5 | 36.1 | 47.3 (+) |
| Women receiving antenatal care within the first trimester of pregnancy (%) | 17.4 | 32.5 | 86.8 (+) |
| Presence at delivery of skilled attendant (%) | 17.6 | 29.1 | 65.3 (+) |
| Number of institutional deliveries (%) | 14.0 | 19.2 | 37.1 (+) |
| Contraceptive prevalence (%) | 27.6 | 35.7 | 29.3 (+) |
| Unmet need for family planning | 21.0 | 23.1 | 10.0 (+) |
| (+) increased<br>(-) decreased | | | |
| Source: National Family Health survey | | | |