



# Community-based Maternal Death Auditing Unnao District, Uttar Pradesh, India

Are we meeting the community  
halfway?

Report

September 2011

Submitted by:  
Indian Institute of Public Health (IIPH),  
Public Health Foundation of India (PHFI)

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# ARE WE MEETING THE COMMUNITY HALFWAY?

## RESULTS OF A COMMUNITY-BASED MATERNAL DEATH AUDIT, UNNAO DISTRICT, UTTAR PRADESH, INDIA.

September 2011

### REPORT SUBMITTED BY

Indian Institute of Public Health, Public Health Foundation of India, Delhi

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## FOREWORD

A country's overall progress and development can be measured by its health indicators. India has made significant strides in improving the health of its people, particularly since the launch of the National Rural Health Mission in 2005. Data from India's Sample Registration System indicates a steep decline in the maternal mortality ratio (MMR) from 327 in 1999-2001 to 212 in 2007-09, a drop of 35 percent. However, maternal mortality continues to be a significant concern, as an estimated 63,000 women still die annually in India, representing nearly one in five of all global maternal deaths.

Although India is making progress towards achieving Millennium Development Goal (MDG) number four, an MMR of 109 by 2015, maternal mortality rates continue to vary greatly across the different regions of the country. Nearly two-thirds of all maternal deaths occur in just nine states – Bihar, Jharkhand, Orissa, Madhya Pradesh, Chhattisgarh, Rajasthan, Uttar Pradesh, Uttarakhand, and Assam. In 2010, the Ministry of Health and Family Welfare, Government of India, introduced the Maternal Death Review (MDR) as a strategy to improve the quality of obstetric care in the country and reduce maternal mortality and morbidity. The MDR provides detailed information on various factors at the facility, district, community, regional, and national levels that is needed to reduce maternal deaths. Analysis of these deaths can help identify the factors that contribute to maternal mortality at various levels and provide information that can be used to fill gaps in service.

Responding to a request from the Government of Uttar Pradesh, USAID, through its Maternal and Child Health Technical Assistance and Research (MCH-STAR) Project, supported a 'Community-based Maternal Death Audit' conducted by the Public Health Foundation of India (PHFI) in the Unnao district of Uttar Pradesh. Among other things, the study found that many of the factors that led to high MMR in the district, like hemorrhage, anemia, sepsis, pregnancy-induced hypertension, hypertensive disorder, and obstructed labor, can be addressed by strengthening the first referral units and by providing appropriate messages on safe delivery to women and their families.

I would like to thank PHFI and the MCH-STAR team for their excellent work on the study and for their recommendations to improve maternal health in India. USAID hopes that the recommendations made in the report will be helpful in operationalizing policies that will save women's lives.



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We are extremely grateful to the Director General and Additional Director General, Department of Medical Health and Family Welfare, Government of Uttar Pradesh (GoUP) for allowing us to conduct this study and providing the necessary support towards this effort. We thank the Chief Medical Officer (CMO), Unnao district, Dr. R. C. Sahni, and the staff at all block level primary health centers (PHCs)/ community health centers (CHCs) in the district, who provided support at various stages of the project by facilitating facility assessments, mobilizing the community for interactions, providing data on maternal deaths from accredited social health activists (ASHAs), auxiliary nurse midwives (ANMs) and sharing valuable inputs with the study team.

We are grateful to the Department of Women and Child Development (DWCD), GoUP and all the *anganwadi* workers (AWWs), who wholeheartedly supported the study by providing key information on maternal deaths from the *anganwadi* centers (AWCs) in the district.

Prof. J. V. Singh, Head of the Dept. of Community Medicine, Chatrapati Sahuji Maharaj Medical University, Lucknow deserves special mention for helping us in identification of field investigators by mobilizing the support of resident doctors and social workers from the School of Social Sciences for conducting verbal autopsies (VA) in the field and also for providing infrastructure support to conduct trainings for investigators.

We would like to acknowledge the support provided by Dr. Kusha Puri, Dr. Rashmi and Dr. Renu Gupta for reviewing the study questionnaires and making the diagnosis despite their busy clinical schedules. We also acknowledge the support provided by Mr. Suneedh Manthri in providing the data management and statistical analysis support.

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We would like to acknowledge the support provided by Shramik Bharti, Kanpur, in implementing this effort by helping us to identify maternal deaths from multiple sources in the district. Last but not the least, we are grateful to Prof. K. Srinath Reddy, President PHFI and Prof. Sanjay Zodpey, Director Indian Institute of Public Health, Delhi for their valuable guidance to the project.

Public Health Foundation of India and Indian Institute of Public Health, Delhi

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## ACRONYMS

ANC	Antenatal Care
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
AWW	<i>Anganwadi Worker</i>
AWS	<i>Anganwadi Supervisor</i>
BPL	Below Poverty Line
EMoC	Emergency Maternal Obstetric Care
EmONC	Emergency Obstetric and Newborn Care
BEmONC	Basic Emergency Obstetric and Newborn Care
CDPOs	Child Development Project Officer
CEmONC	Comprehensive Emergency Obstetric and Newborn Care
CHC	Community Health Center
CMO	Chief Medical Officer
DH	District Hospital
DWCD	Department of Women and Child Development
EAG	Empowered Action Group States
FRU	First Referral Unit
GoI	Government of India
GoUP	Government of Uttar Pradesh
ICDS	Integrated Child Development Scheme
IFA	Iron Folic Acid
IIPH	Indian Institute of Public Health
JSK	<i>Jansankhya Sthirata Kosh</i>
JSY	<i>Janani Suraksha Yojana</i>
KI	Key Informant
LSCS	Lower segment Cesarean section
MAPEDIR	Maternal and Perinatal Death Inquiry and Response
MDA	Maternal Death Audit

MDG	Millennium Development Goal
MDR	Maternal Death Review
MoHFW	Ministry of Health and Family Welfare
MMR	Maternal Mortality Ratio
MNCH	Maternal Newborn Child Health
MO	Medical Officer
MOIC	Medical Officer in Charge
MS	Medical Superintendent
NGO	Non-government Organization
NRHM	National Rural Health Mission
PHC	Primary Health Center
PHFI	Public Health Foundation of India
PIH	Pregnancy Induced Hypertension
PPH	Post Partum Hemorrhage
PRI	<i>Panchayati Raj</i> Institution
RCH	Reproductive and Child Health
SBA	Skilled Birth Attendant
SC	Scheduled Caste
SMI	Safe Motherhood Initiative
SRS	Sample Registration System
ST	Scheduled Tribe
TBA	Traditional Birth Attendant
UP	Uttar Pradesh
VA	Verbal Autopsy

# EXECUTIVE SUMMARY

## Rationale and Objectives

Despite progress in recent decades, India has the largest number of maternal deaths of any country in the world. Moreover, maternal deaths in India are concentrated in the empowered action group (EAG) states, notably in Uttar Pradesh (UP). The Government of UP (GoUP) requested the Public Health Foundation of India (PHFI)/ Indian Institute of Public Health (IIPH) to conduct a community-based maternal death audit (MDA) in Unnao district. The objectives of this study were to:

- identify operational issues and (if possible) solutions to conducting maternal death audits (MDAs) at the community level, based on the GoUP guidelines;
- identify the main causes and processes leading to maternal deaths (medical or otherwise); and
- make recommendations to the GoUP on ways to improve maternal health services at the community and/ or the facility level.

## Methods

**Government health facility “gap” assessments:** A team of six physicians conducted facility assessments in 15 out of 16 districts and block health facilities in Unnao district. This process took about five days and included the District Women’s Hospital, two community health centers (CHCs) designated as first referral units (FRUs), four CHCs, and eight block primary health centers (PHCs). The District Women’s Hospital and two designated FRUs are meant to provide Comprehensive Emergency Obstetric and Newborn Care (CEmONC) services, while the block PHCs are meant to provide Basic Emergency Obstetric and Newborn Care (BEmONC) services.

**Maternal death reporting and verbal autopsies:** The existing government maternal death reporting form was distributed to *anganwadi* workers (AWWs) and auxiliary nurse midwives (ANMs). ANMs were asked to distribute copies to accredited social health activists (ASHAs). These community workers were then asked to report information on all female deaths in the age group of 15-49 years, reported in Unnao district during 1 June, 2009 to 31 May, 2010.. Information on maternal deaths was also sought in the health facilities. A total of 153 maternal deaths were identified. Of these, a sample of 70 was randomly selected for performing verbal autopsies (VA). The VA form could be administered only in 57 cases, as seven deaths were subsequently not found to be related to pregnancy or childbirth, two were outside the study period, insufficient information was available for two cases while two cases could not be traced. In each case, a cause of death was assigned by a panel of three obstetricians.

## Findings

**Government health facility “gap” assessments:** Fifteen of the facilities assessed should have been providing BEmONC, according to the Government of India (GoI) guidelines. Our findings showed that none of them met the recommended standards. Two thirds of the facilities studied did not report treating **any** women with maternal complications. Deficiencies in staffing, drug supply, equipment, training and management were identified as gaps in efficient delivery of services.

**Maternal death reporting:** We estimated that 248 maternal deaths were expected to take place in the study area and period, but only 153 (62%) were reported using AWWs, ANMs, ASHAs and health facilities. The AWWs reported 76 percent of the maternal deaths. For nearly half of the deaths (47%), the AWW was the only source of identifying the death. Health workers in the community (ASHAs and ANMs) were the sole source of information on 19 percent of the reported deaths. Only three (2%) maternal deaths were reported from all the health facilities studied, and none of these deaths were picked up by the community workers. Another five deaths (3%) were reported only by non-government organizations (NGOs) or *panchayati raj* institutions (PRIs).

**Verbal autopsies:** *Information gathered from the families of women who died paints a vivid picture of families struggling to get help, without success.*

- Only 13 women (23%) died at home. The rest died either in a health facility (46%), or while trying to reach a facility that provided the life-saving care they needed (31%).
- Out of the 10 women who died, eight had been taken to at least one health facility; five out of 10 were taken to at least two facilities, and more than two in 10 were taken to three facilities before they died.
- More than half of the families borrowed money before going to even the first facility.
- None of the families reported receiving *Janani Suraksha Yojana* (JSY) funds.
- Deliveries of 19 (33%) women were conducted by a person with some medical training: an obstetrician (3), a doctor (10), a nurse (3), or an ANM (3).
- Only 31 percent of the babies born were alive after one month, 31 percent were still-born, while 38 percent died within one month of birth.

The major causes of the 57 deaths investigated were hemorrhage (22 cases); anemia (15); sepsis (8), pregnancy induced hypertension (PIH) and hypertensive disorder (6), obstructed labor (4), and unknown (2). Our study did not identify any death as abortion-related, which is most likely due to under reporting.

## Recommendations

### Lessons learned about conducting MDAs

**It is critical to include non-health community workers in identifying deaths.** In our study, AWWs were by far the best source of information on maternal deaths.

**MDAs should not be used to monitor either the level or medical causes of maternal deaths.** Less than half of the expected maternal deaths in the area were identified, despite our mobilization of community workers and site visits to facilities. Moreover, there is a possibility that the deaths that were identified may not be a representative sample for identifying cause of maternal death, as no abortion-related death was identified.

### Actions needed to reduce maternal deaths

**To reduce delay, distance and cost, local and state governments must monitor and improve the performance of EmONC in their facilities.** Although all the facilities reported performing deliveries 24/7, most of them did not have even the basic drugs to treat obstetric complications.

**State and local governments should map their functioning EmONC facilities and target to upgrade to existing standards those facilities that should most improve access to their services.** If the women in our study had been able to receive treatment or medical stabilization at the PHC/ CHC nearest to them, and even if they needed to be referred for surgery, many deaths could have been prevented.

**Priority should be given to increasing the availability of emergency transfusions by using blood storage units.** Appropriate facilities, based on geographical location, proximity to the population, staffing, and delivery load, could be selected, to provide for emergency blood transfusions. This single recommendation alone could avert many maternal deaths. The drug Misoprostol should be made more widely available.

**Community education activities for maternal survival should be tailored to local needs and realities.** Many of the women whose deaths were studied did not plan to deliver at home. In most cases, their families recognized the seriousness of their condition and did everything they could to get them help, including borrowing substantial amounts of money.



## BACKGROUND

Over the past several decades, the GoI donors and interest groups have given special focus to improving maternal, newborn and child health (MNCH) through policies and program guidelines. However, implementations of these policies on-the-ground have been extremely challenging; thus, the expected results have not been achieved as per the commitments. This underscores the need for developing strategies and accountability mechanisms that will improve program implementation and service delivery on the field.

Each year, 98-99 percent of the maternal and perinatal deaths in the world occur in developing countries. An estimated 42 percent of the maternal deaths are intrapartum, i.e., related and closely linked to death of one million babies during labor<sup>1</sup>. India contributes to the largest number of maternal deaths in the world<sup>2</sup> and nearly two-thirds (62%) of these deaths take place in the EAG states (Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttaranchal and Uttar Pradesh) and Assam<sup>3</sup>. Safe Motherhood is a top priority of the country's National Rural Health Mission (NRHM) launched in 2005. India's progress in reducing maternal deaths is crucial to the global achievement of the Millennium Development Goal 5 (MDG 5) – i.e., reducing India's maternal mortality ratio (MMR) to 109 by 2015.

To address this important issue, a major policy initiative has been launched by the GoI, including increasing institutionalization of deliveries facilitated through the JSY that provides cash incentives for institutional births. Recently, the GoI has issued National Guidelines for states to carry out maternal death reviews (MDRs) at both the community and the facility levels.<sup>4</sup>

In terms of maternal deaths, UP has an MMR of 3,595<sup>5</sup> [SRS (2007-2009)], the second highest of all the states in the country, and one out of five maternal deaths in India occur in UP. To gain an in-depth understanding of processes and causes leading to maternal death, the GoUP is in the process of implementing MDAs in the state, based on the GoI's guidelines. GoUP requested PHFI to conduct a community-based MDA in Unnao district of UP. This study will help the GoUP to identify the operational issues in implementing the MDA guidelines and suggest recommendations for improvement in life-saving services for women.

<sup>1</sup> Lawn JE et al. 2009. 3.2 million stillbirth: Epidemiology and overview of the evidence review. *BMC Pregnancy Childbirth* 2009; 9(Suppl 1):S2. (7 May 2009). doi:10.1186/1471-2393-9-S1-S2.

<sup>2</sup> Ronsmans C and Graham WJ 2006. Maternal mortality: who, when, where, and why. *The Lancet*, Volume 368, Issue 9542, pages 1189-1200, 30 September 2006. doi:10.1016/S0140-6736(06)69380-X.

<sup>3</sup> Registrar General of India 2011a. *Special Bulletin on Maternal Mortality in India: 2007-2009, Trends, Sample Registration System*. New Delhi: Government of India, Ministry of Home Affairs, Registrar General of India. June 2011.

<sup>4</sup> Maternal Health Division, Ministry of Health and Family Welfare, Government of India 2011. *Maternal death review: Guidebook*. New Delhi: National Health Systems Resource Centre.

<sup>5</sup> Registrar General of India. June 2011. *Special Bulletin on Maternal Mortality in India: 2007-2009, Trends, Sample Registration System*. New Delhi: Registrar General of India.

## WHY DO MDAs?

In India, millions of women still deliver at home, in the absence of skilled birth attendants (SBAs) and without access to key health services. Therefore, a significant number of maternal deaths take place outside the realm of health facilities. In Asia, five direct complications generally account for more than 70 percent of maternal deaths: hemorrhage (31%), sepsis/ infection (12%), unsafe abortion (6%), hypertensive disorder (very high blood pressure leading to seizures – 9%), and obstructed labour (9%).<sup>6</sup> Contributory causes include chronic malnutrition, anemia, and early marriage and childbearing. Besides direct medical and co-existing medical causes aggravated by pregnancy, the functioning of the health system greatly influences the quality, availability, accessibility, acceptability and quality of medical services and health services. It is well known that very often complications related to childbirth cannot be predicted; however, maternal deaths can be prevented through skilled care during deliveries and timely access to Emergency Obstetric Care (EmOC) for treatment of complications.<sup>7</sup>

Although widely used standardized definitions of maternal mortality exist, for several reasons, it is difficult to measure accurately the levels of maternal mortality in a population. **First**, it is challenging to identify maternal deaths, particularly in settings where routine recording of deaths is not complete within civil registration systems. **Second**, even if a woman's death is recorded, her pregnancy status may not have been known or mentioned (e.g., in the case of abortion) and the death would therefore not have been reported as pregnancy-related. Third, even where MMRs are high, they are too few to calculate stable MMRs, unless there is a huge sample size.

For these reasons, in India, data on MMRs is usually derived from large surveys, such as the sample registration system (SRS). However, these studies do not provide the kind of detail on the chain of events and factors that lead to death. MDR is a tool that has been widely used in countries to provide information on the quality of care given to women and children. This information can be used to improve accountability of the health sector, which can, in turn, contribute to reducing mortality.

It is important to understand that data from MDA has its limitations. It can tell us a great deal about the process leading to deaths. However, it cannot tell us enough about the level and medical causes of maternal deaths for comparison among sites or over time. This subject is explored further in the Discussion section of this report.

The present study was conducted to provide an in depth understanding of the factors and chain of events leading to maternal deaths in the community. It is also expected to highlight key operational issues in conducting MDRs in the community, and to identify some of the issues which facilitate and hinder delivery of services to the end user. This will help to advocate for policies which would help the GoUP to take corrective measures. The relevance of this study extends to other states where a similar process of MDA is underway.

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<sup>6</sup> Khan KS et al. 2006. WHO Analysis of Causes of Maternal Death: A systematic review. *The Lancet*, Volume 367, Issue 9516, pages 1066-1074, 1 April 2006. doi:10.1016/S0140-6736(06)68397-9.

<sup>7</sup> Paxton A et al. 2005. The Evidence Base for Emergency Obstetric Care. *International Journal of Obstetrics & Gynecology* 88(2):181-193.

## GOAL AND OBJECTIVES

The overall goal of this project is to assist the GoUP in reducing maternal deaths.

### The Key Objectives

1. identify operational issues and (if possible) solutions to conducting maternal death audits at the community level, based on GoUP guidelines;
2. identify the main causes and processes leading to maternal deaths, medical or otherwise;
3. make recommendations to the GoUP, on ways to improve maternal health services at the community and/ or facility level

# METHODOLOGY AND PROCESS

## Study Design

The present study is a descriptive study which aims to capture characteristics and processes leading to death, of the sampled maternal deaths identified in the period 1 June 2009 to 31 May 2010, from various sources, in Unnao district, UP.

## Study Site

UP has one of the highest reported MMRs of any state in the country. Unnao district in UP was selected in consultation with the GoUP, based on the grading of the districts by JSK, a registered autonomous society of the Ministry of Health and Family Welfare (MoHFW)<sup>8</sup>. The selection of the district is based on a composite index of 13 socio-economic and demographic indicators, including the percentage of women having three or more children, contraceptive prevalence, under-five mortality rate, and the percentage of women having three or more antenatal visits. Unnao district was chosen, after due consultation with the state government, as the study district based on the average ranking of 48 out of 70 districts ranked in the state.

Unnao district is surrounded by Hardoi district in the north, by Lucknow district in the east, by Rae Bareilly district in the south and in the west by the River Ganga, which separates it from districts of Kanpur and Fatehpur.

**Table 1. Characteristics of Unnao district, Uttar Pradesh, 2010<sup>9</sup>**

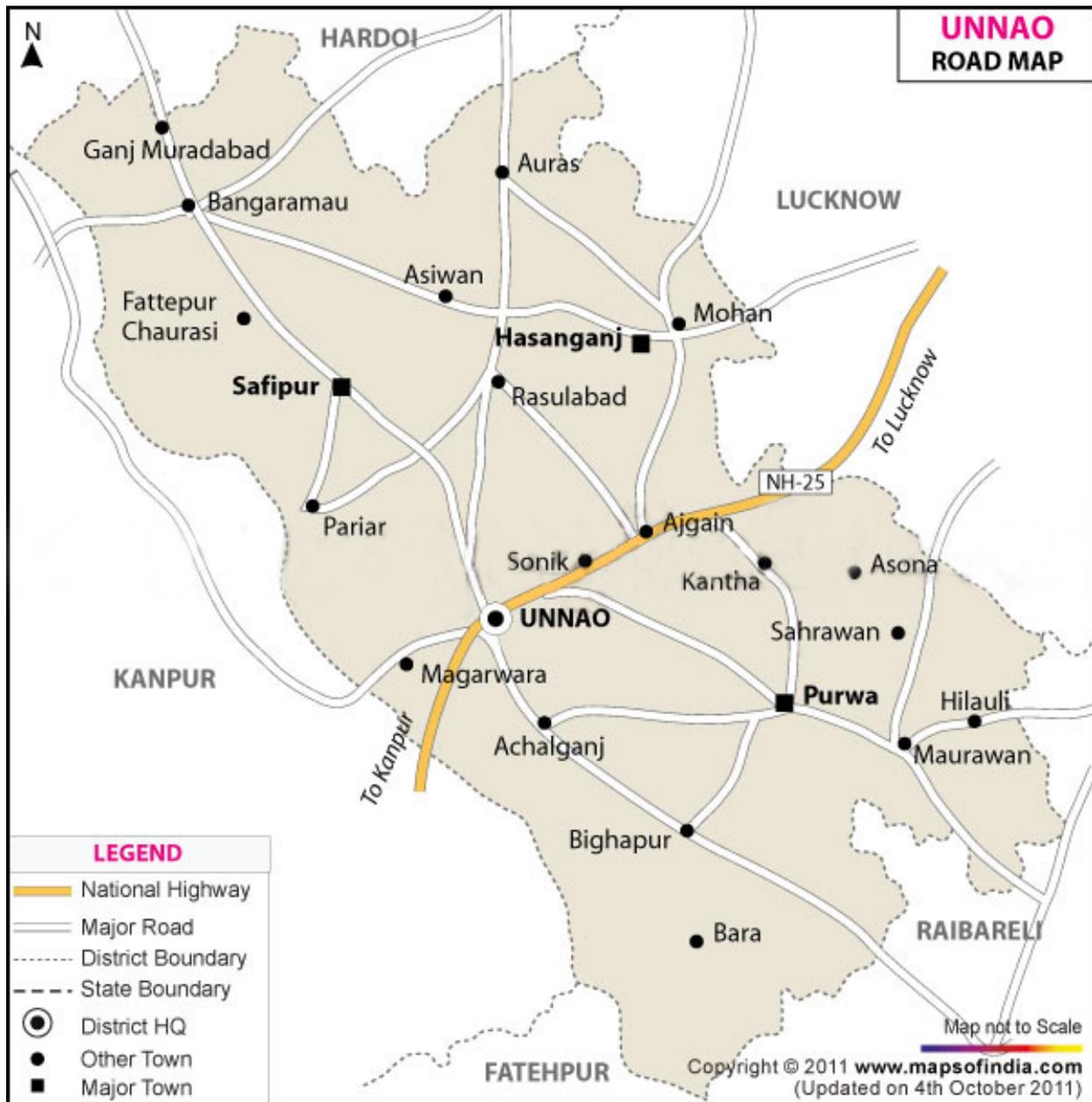
Indicator	Data
Total area	4,558 sq. km
No. of blocks	16
Total population	3,110,595
Estimated no. of deliveries based on a birth rate of 22.2/ 1000 population	69,055
No of institutional deliveries (%) <sup>10</sup>	14,488 (45.10)
No. of district hospitals (DHs)	1
No. of CHCs working as FRUs	2
No. of <i>anganwadi</i> centers	2,376

<sup>8</sup> [http://www.jsk.gov.in/district\\_health.asp](http://www.jsk.gov.in/district_health.asp)

<sup>9</sup> <http://www.census2011.co.in/census/district/527-unnao.html>

<sup>10</sup> Data available with District Program Management Unit, Unnao

Figure 1. Unnao district, Uttar Pradesh, India



## Study Instruments

The existing government maternal death reporting form for AWWs, ASHAs and ANMs was used to collect basic information on all female deaths in the age group of 15-49 years during the specified study period.

Information on services provided was collected from the district women’s hospital, designated FRUs, CHC and block PHCs by using “Facility gap assessment instrument” developed for this study. This tool was adapted from another study “Technical assistance to Government of

Jharkhand in Operationalizing FRUs” being conducted by the investigators. The tool was specifically modified to collect information related to provision of BEmONC and CEmONC services and was field tested by the investigators in one facility and subsequently used in all facilities after making the required modifications. Information on maternal deaths occurring in the previous year was also sought in these facilities.

A modified VA tool used in the Maternal and Perinatal Death Inquiry and Response (MAPEDIR) initiative was used for this purpose. The MAPEDIR tool was developed by UNICEF and has been used to conduct community based MDA in various states of the country.<sup>11</sup> The tool was simplified to collect information, which had direct operational relevance and was more in line with the VA tool finalized with the GoI.

## Preparatory Phase

To gather information on deaths in the community, government community workers from the MoHFW (ANMs and ASHAs), as well as those from the Ministry of Women and Child Development’s Integrated Child Development Services (ICDS) program were involved. To enlist the assistance of the District Health officials, in July, 2010, the PHFI project team visited the district headquarters in Unnao district to meet with the CMO. Medical Officers in Charge (MOIC) and Medical Superintendents (MS) attended this meeting from the 16 blocks of Unnao. The objective of this meeting was to inform them about the project and seek their cooperation and to discuss data collection forms and the process for identification of maternal deaths in the community and at the facility level. MOICs were requested to mobilize ASHAs and ANMs to gather data. Details obtained during this process included village/ block demographic information, name of the deceased, information on health services in the community/ facility and details of the service providers.

A similar meeting with the district program officers of the ICDS program was called. However, as there was no official order from the state government, the inability to support the activities was expressed by the ICDS officials. To address this concern, a meeting with the Director of the ICDS was held and as an outcome of that meeting, an official communication was sent to Child Development Project Officers (CDPOs) in 16 blocks of Unnao. Soon after, a meeting was called where the CDPOs from all 16 blocks of Unnao were oriented on the project framework, data collection tools and the process to be followed. The definition of maternal death was explained, as the death of a woman during pregnancy and within six weeks of delivery.

## Ethics Approval

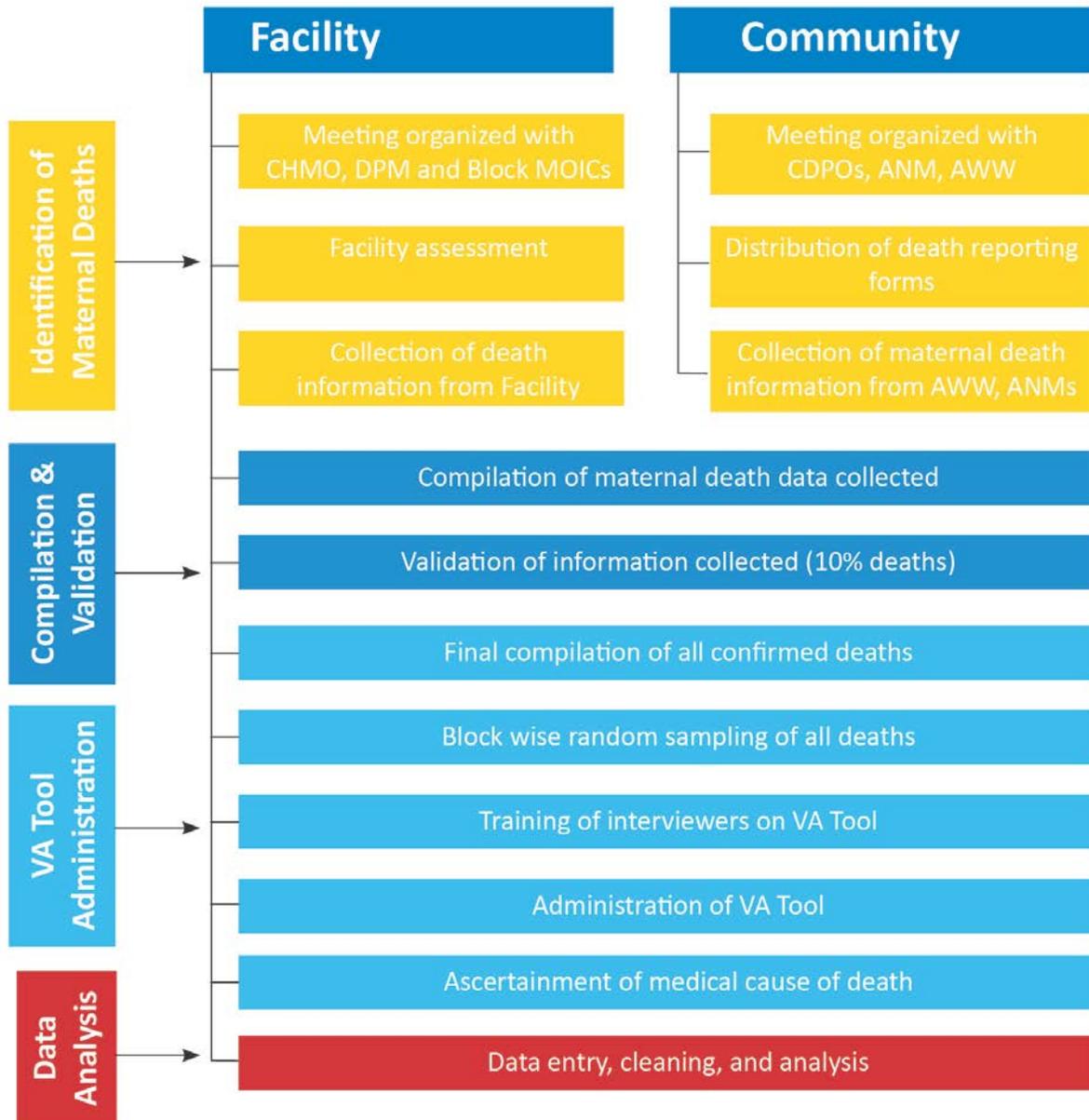
Ethics approval for the study was obtained by the Ethics Committee PHFI.

**The Study Process:** This is presented in Figure 2(p. 7)

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<sup>11</sup> <http://mapedir.org/>

**Figure 2. The Study Process**



### Identification of Maternal Deaths

Health Education Officers were requested to provide copies of the government death reporting form to ANMs directly. ANMs further distributed the format to ASHAs. *Anganwadi* supervisors (AWS) were also given the same reporting form and asked to distribute them to AWWs. All the forms were collected from the ANMs and AWS after two weeks. This process took nearly one month to be completed. Maternal death reporting forms were distributed to around 265 ANMs,

ASHAs, and 2,573 AWWs during their weekly visits to the PHC and monthly meetings. Fifteen days were allocated to them to report data of the maternal deaths that occurred in the project reporting cycle, i.e., June 2009 to May 2010.

This was followed by the process of verifying the reporting of maternal deaths. Out of the maternal deaths that had taken place, ten percent were selected randomly for confirmation by either interview with the family in person or by telephone, so as to ensure validity of the death reports by the key informants (KIs). All the maternal deaths reported were found to be valid maternal deaths reported by the informants.

A total of 207 maternal deaths were reported by the KIs from all the blocks in Unnao district, except for the two urban blocks i.e., Shuklaganj, and Unnao city. Although the study period was indicated in the reporting format, yet deaths even outside the study period were reported by the KIs. Of these 207 deaths, 159,153 had occurred in the study period i.e., between 1 June 2009 and 31 May 2010. During verification, six of these deaths were found to be due to causes not related to pregnancies, hence, excluded. Out of these 153 deaths, a sample of 70 deaths was selected. All the maternal deaths in the age group of 15-49 years of age, which had occurred in the study period, were listed by the block where the death of the woman had occurred. They were then randomly sampled in proportion to the deaths in each block. The VA form could be administered only in 57 cases, as seven deaths were subsequently not found to be related to pregnancy or childbirth, two were outside the study period, insufficient information was available for two cases and two cases could not be traced.



## Interviewing of Families for the MDA

A community-based MDA was carried out based on maternal deaths identified in the community from June 2009 to May 2010 in Unnao district. A data collection team was recruited which comprised of five MBBS doctors and five social workers. A one-day training was conducted in Lucknow on how to approach the community and family members to explain the purpose of this study, and gather facts required to fill in the forms. This was done under the supervision of PHFI staff and field data was collected between 1-3 Nov and 8-10 November, 2010.

A team of three obstetricians with significant experience in community and facility based obstetric care was identified. All the VA forms were reviewed by two of the obstetricians and based on the available information on history, events and symptoms indicated on the form, the probable cause of death assigned independently. If the diagnosis of the two obstetricians matched, it was considered final. However, in case of disagreement, the third obstetrician reviewed the forms and her diagnosis was considered as final. A sub-sample of eight cases was identified which highlighted information on particular issues that contributed to the maternal

deaths. Families of these women were interviewed to understand the causes of death and its social implications for the immediate family.

The data collected was coded and analyzed and emergent themes were documented and studied for understanding their implications on reducing maternal mortality. All analysis was done using SPSS 17©.

## **Facility Assessments**

Facility assessments were conducted in 15 out of 16 district and block health facilities in Unnao. This included the District Women's Hospital, two CHCs designated as FRUs (Nawabganj and Hassanganj), four CHCs (Purva, Safipur, Miyaganj and Bangarmau), and eight block PHCs (Asoha, Auras, Bichiya, Bighapur, Fatehpur Chaurasi, Ganj Moradabad, Hilauli, Sumerpur). The District Women's Hospital and two designated FRUs were meant to provide CEmONC services, while the block PHCs were meant to provide BEmONC services. PHC Achalganj was not assessed as it is very close to Kanpur and most of the maternity cases avail the facility at Kanpur rather than PHC Achalganj.

Investigators were identified to conduct the assessment of the facility. The team comprised of six doctors, including three PHFI staff. The team divided itself into groups of three. They were provided with one day of training on the gap assessment tool. Orientation was provided to the team after which the team dispersed into the field for data collection. Facilities were visited with an objective of checking availability and access to health services. This process took a total of five days.

# KEY FINDINGS

## Findings from the Death Identification Process

Our experience confirmed what many earlier researchers had found, that many maternal deaths were not reported, even when a variety of community methods were used<sup>12</sup>.

The table below shows maternal deaths expected annually in the study area, given the estimated MMR of 359 maternal deaths per 100,000 live births (MMR for UP as a whole), a birth rate for rural areas, of 22.2 births per 1,000 population<sup>13</sup>, and the estimated population of approximately 3.1 million. A breakdown by block and facility studied is presented in the Appendices.

**Table 2. Population, estimated births and maternal deaths, maternal deaths reported, Unnao district, UP, 2010**

	Population	Estimated births	Estimated maternal deaths	Maternal deaths identified	Percentage of estimated maternal deaths identified
Unnao	3,110,595	69,055	248	153	62

Table 3 shows the sources of information on the 153 maternal deaths. Surprisingly, perhaps the most productive source of information was the AWWs who work for the ICDS program, not the health sector. ICDS represents one of the world’s largest programs for early childhood development, providing pre-school education and supplementary nutrition to children, pregnant and lactating mothers, through the AWWs. AWWs reported 76 percent of the maternal deaths. For nearly half of the deaths (47%), the AWW was the only source for identifying the deaths. Health workers in the community (ASHAs and ANMs) reported half of the known deaths and were the sole source of information on 19 percent. It is very surprising that only three (2%) maternal deaths were reported from all the health facilities studied and none of these deaths were picked up by the community workers. Another five deaths (3%) were reported only by NGOs/ PRIs.

<sup>12</sup> WHO 2006. *Prevention of maternal mortality: Report of a WHO interregional meeting, Geneva, 11-15 November, 1985*. Geneva: WHO.

<sup>13</sup> Registrar General of India 2011b. *Annual Health Survey Bulletin 2010-11 Uttar Pradesh*. Government of India, Ministry of Home Affairs, Office of Registrar General & Census Commissioner. 2011.

**Table 3. Distribution of identification of known maternal deaths by source, Unnao district, UP, 2010-2011.**

	N (%) of known deaths reported (N=153)	N (%) Reported by this source only (N=153)
AWW	116 (76)	72 (47)
ASHA and ANM	72 (47)	29 (19)
AWW, ASHA, ANM		44 (29)
Health facility		3 (2)
Others (NGO)		5 (3)

## Findings from Facility Assessment

**Basic Emergency Obstetric and Neonatal Care (BEmONC) facilities:** BEmONC services consist of services that address the major obstetric and neonatal complications. These include providing parenteral antibiotics, oxytocin, and anticonvulsants in addition to manual removal of the placenta, retained products and performing assisted vaginal delivery. Fifteen of the facilities assessed should have been providing BEmONC, according to GoI guidelines. Our findings showed that none of them met the recommended standards. Two thirds of the facilities studied did not report treating **any** women with maternal complications. Furthermore, of the 15 facilities studied, two facilities did not report referring any women with maternal complications.

- Infection: 33.3 percent facilities did not have antibiotic injections available in the labor room.
- Hypertensive disorder: None of the 15 facilities had injectable magnesium sulphate available for management of eclampsia.
- Postpartum hemorrhage: Out of the facilities, 40 percent did not have parenteral oxytocin in the labor room, while 66.7 percent facilities did not have it in the store. Misoprostol was also not available in 53 percent of the facilities.
- Abortion complications: None of the facilities reported treating any women for abortion-related complications.
- Obstructed labor: Although 24/7 normal delivery care is available in all the 15 facilities assessed, assisted deliveries (vacuum extraction, forceps) are conducted in only two facilities 24/7. Nearly all (95%) of the assisted deliveries in the district were conducted in the DH.
- Neonatal Care: Out of the facilities, 20 percent did not have a designated newborn baby corner, 73 percent of the facilities did not have a weighing scale and mucus sucker, while 80 percent did not have an overhead radiant warmer. A functioning, self inflating Ambu bag and face mask was not available in 93 percent of the facilities.
- A functional oxygen supply was not available in 47 percent of the facilities.

## CEmONC Facilities

Comprehensive EmONC includes all the functions of Basic EmONC plus surgery and blood transfusion. Our assessment showed that only the District Women’s Hospital provides round the clock cesarean section services. Nearly all the cesarean section deliveries conducted during the previous year were at the DH, and only seven were conducted in the two CHCs that have been designated FRUs.

## Human Resources

- Both the designated FRUs had an obstetrician, anesthetist and pediatrician on staff but round the clock services were not available except in the district hospital (DH).
- While two PHCs with 24/7 delivery services did not have a lady MO, seven of the PHCs did not have a qualified staff nurse posted.

## Infrastructure

Based on the condition of walls, ceiling, lighting, availability of essential equipment and instruments, the condition of the labor room and the operation theatre in both the FRUs and the condition of the facilities were found to be unsatisfactory.

## Support Services

- Out of the facilities, 40 percent did not have any functional ambulance available and 47 percent facilities did not have adequate funds available to operate the ambulances.
- No facilities have referral transport available round the clock and 60 percent of the facilities had never formally transferred a pregnant woman/ postpartum mother to another facility.
- Out of the 9,355 deliveries reported by the facilities in the three months prior to the gap analysis, only 260 cases (less than 1%) were known to have been referred. This is in stark contrast to the general standard that about 15 percent of women will need either Basic or Comprehensive EmOC.<sup>14</sup>
- Although all the facilities could conduct hemoglobin estimation, 73 percent of the facilities did not even conduct two hemoglobin investigations a day.
- Among the facilities, 67 percent did not have any staff trained in waste management.
- Out of the facilities, 20 percent did not have 24 hour running water supply.

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<sup>14</sup> Maine D et al. 1997. *Guidelines for Monitoring the Availability and Use of Obstetric Services*. [UNICEF/WHO/UNFPA] New York: UNICEF. September 1997.

## Findings from Verbal Autopsy

### Sources of Information

Since very few deaths were reported by the health facilities, most of the information on the deaths came from the Vas in the community. Of the 57 deaths investigated, information was obtained from husbands and women in the household. Table 4 shows where the deaths are reported to have occurred.

**Table 4. Reported place of death in MDAs, Unnao district, Uttar Pradesh, 2010-2011**

	Number	Percent
Home	13	22.8
En route to a formal health facility	18	31.6
Government hospital	17	29.8
Private facility	9	15.8
<b>Total</b>	<b>57</b>	<b>100</b>

Based on the verbal autopsies (and medical records available with the relatives in a few cases), the major causes of the reported deaths were hemorrhage (22 cases); anemia (15); sepsis (8), PIH and Hypertensive disorder (6), obstructed labor (4), and unknown (2). Our study did not identify any death as abortion-related, which is most likely due to under-reporting. Even though abortion is legal in India, many studies have shown that it is still a major cause of maternal death, due to lack of access to safe abortion services.<sup>15</sup>

Of our sample of 57 deaths, nine women (16%) died in the antenatal period (3 each from anemia, hypertensive disorder and obstructed labor). Another 33 (58%) died on the day of delivery, with the rest of the deaths spread out over the next 25 days. According to the family responses (available for 28 cases), only one woman (4%) planned to deliver at home, while 24 of the 57 women for whom we have VAs (49%) did so. Nineteen (33%) women were delivered by a person with some medical training: an obstetrician (3 women), doctor (10), nurse (3), or ANM, 3 women). Of the rest, 20 were attended to by no one or a relative, and five were attended to by traditional birth attendants (TBAs) or “quacks.” Only six women are reported to have had a cesarean delivery. As far as neonatal outcome was concerned, only 31 percent of the babies born were alive after one month, 31 percent were stillborn, and 38 percent died within one month.

Table 5 below shows the site where delivery and death took place. While 13 deaths took place at home (22.8%), it is striking that the vast majority of women were either in a facility when

<sup>15</sup> Santhya KG and Verma S 2004. Abortion: The current scenario in India. In Population Council. *Looking back, Looking forward: A profile of sexual and reproductive health in India*. New Delhi: Population Council. January 2004.

they died or on their way to one. Of the 27 women who died in a health facility, one third died in a private facility while two-thirds died in a government facility.

**Table 5. Location of deliveries and deaths in Maternal Death Review in Unnao district, Uttar Pradesh, 2010.**

	Home	En route	Facility 1	En route	Facility 2	En route	Facility 3	Total
Delivered	24	1	17		5		2	48
Died (all causes)	13	6	7	9	9	2	11	57
<b>Details by cause of death</b>								
Died (hemorrhage)	6	1	3	5	3	1	3	22
Died (anemia)	4	2	1	3	3		2	15
Died (sepsis)	2			1	1		4	8
Died (hypertensive disorder)	1	2	1			1	1	6
Died (obstructed labor)		1	1		1		1	4
Died (other causes)			1		1			2

## What Caused the Fatal Delay?

Internationally, the “3 delays model” has been used to analyse the health system and to categorize the many medical, infrastructural and social factors that contribute to deaths.<sup>16</sup> The premise underlying this model is that, although most serious obstetric complications cannot be predicted or prevented, if women with complications get timely, adequate obstetric care, they will not die or have long-lasting morbidity.

- **Delay #1** occurs at the family level, where the decision to seek care is made. There are many reasons why women with serious complications do not always get care promptly – e.g., socio-cultural factors, financial constraints, lack of awareness and/ or poor opinion of the quality of care at health facilities.
- **Delay #2** occurs when a woman leaves her home and is en-route to a health facility or when she is traveling between health facilities as a result of a series of referrals.
- **Delay #3** is caused due to factors related to availability, efficiency and quality of services at the health facility,

<sup>16</sup> WHO et al. 2009. *Monitoring emergency obstetric care: A handbook*. Geneva: World Health Organization, UNFPA, UNICEF and Mailman School of Public Health. Averting Maternal Death and Disability (AMDD).

Using the “3 delays model”, we present the key findings from the MDA:

**Delay #1:** Delay in deciding to seek care can have many components. In our study, in only eight cases (14%) did the family report that they had not sought care for the woman because they did not realize how serious her illness was. The most common reason cited by families for not seeking care was lack of available transport (28%). Other reasons cited were the cost of transport and that it was late at night (2 cases each). It is easy to see how time could be lost while families weighed all these factors. For example, in cases where death was due to obstructed labor, the average delay in deciding to seek care was more than four hours. Husbands are reported to have played an important role in more than half of all the care seeking decisions.

**Delay #2:** Delay in reaching a facility at which the necessary level of care was available was a time-consuming and expensive process for these women and their families. As Table 6 below shows, of the 57 cases in our sample, eight out of 10 women who died were taken to at least one health facility seeking life-saving care; five out of 10 women were taken to at least two facilities; and more than two out of 10 women were taken to three facilities. According to the families’ reports, by far the most common mode of transport to all facilities was taxi/ auto/ tractor. Only in transfers from Facility 2 to Facility 3 was there mention of travel by ambulance provided by the health facility.

**Table 6. Place of death, MDAs, Unnao district, UP, 2010-2011**

All Cases	Home	Trip	Facility 1	Trip	Facility 2	Trip	Facility 3
N = 57	13	6	7	9	9	2	11
Sought care at and reached a facility			46 (81%)		32 (56%)		14 (25%)
Mean time spent to decide (hours)	4		10				
Mean time to make arrangements/ travel (hours)	3		3		3		
Mean travel time (hours)		1.25		1.25		1.5	
Mean distance (km)		12.6		35		34	
Mean duration of stay (hours)			20		13		19
Mean cost of transport (rupees)*		255		1,040		910	
Mean cost of care (rupees)*			3,045		10,320		11,900
Had cash to seek care			44%		37%		0
Borrowed money			56%		56%		100%
Sold assets					4%		

\* Rs. 45 = US\$1

Being sent from one facility to another (and another) adds to delay that may be dangerous. Interestingly, the most common reason given for not taking the woman to a second facility after referral from the first was lack of confidence in the care in the facility.

More than half of the families had to borrow money to even take women to Facility 1, while 100 percent women borrowed money for treatment at Facility 3. UP, being an EAG state, entitles full JSY payments to all mothers who deliver in an institution. Therefore, all women are entitled to a government payment to cover the costs of delivery. However, none of the families reported having received this payment.

Although all the public hospitals are supposed to provide free care, there are still costs associated with the purchase of drugs unavailable at the facility and for unofficial charges to be paid. Care at the private facility is totally paid for by the individual.

**Delay #3:** While attention is often focused on Delays #1 and #2, the information provided by the MDA clearly shows that Delay #3 – i.e., delay in receiving appropriate care once at the facility -- played an important role. Half of the women had to be taken to at least two facilities for management of their complications, thus losing precious time. More than 50 percent of the women were taken to the PHC first and then referred to the DH. Although 25 percent of all women had prolonged labor, only one DH had the facility to conduct cesarean deliveries on a round-the-clock basis. Of the women who died of obstructed labor, none had a cesarean section delivery in a public facility. All of the women who delivered by cesarean section did so in private facilities. Out of all maternal deaths reported, seven percent had obstructed labor and none of them had been delivered by cesarean section.

## DISCUSSION

### Reporting of Maternal Deaths

A community MDA is a very useful tool for program planners and managers and health advocates, as long as the data is used in an appropriate way and their strengths and weaknesses are kept in mind. The strengths of the MDA lie in the depth of information that can be gathered on the process that the woman and the family went through and the barriers they faced. It may be useful to think of the MDA as a collection of videos of individual cases of maternal death.

The limitations of the MDA are directly related to its strengths. While it can give us details about a sample of maternal deaths, it cannot give us the big picture, e.g., the level of maternal mortality in the study area. The difficulties of identifying maternal deaths have been reported from both developed and developing countries for decades, yet they are always somehow shocking. In our study, we took advantage of the extensive network of community workers in India (ANMs, AWWs and ASHAs) to report maternal deaths that might have escaped official notice. By comparing the expected number of deaths in the study area in a year, to the number reported by the community workers, we estimate that we identified about half of maternal deaths. This is not an unusual finding. It seems that the only way of identifying nearly all maternal deaths in developing countries is to do a repeat household survey, where the absence of any person is explored. This has been done for many years in Matlab, Bangladesh. Unfortunately, it is too expensive and time consuming to do this for a large area (e.g., even for a whole district in UP).

A related limitation concerns the distribution of clinical causes of maternal death. Of the expected 248 maternal deaths, 153 were reported using all of our sources combined. A sample of 70 deaths was randomly selected, and of these, an MDA could be completed in 57 cases. Thus, the information we have is on a sub-sample of a randomized sample of maternal deaths. Furthermore, we know that the reported cases are not representative of all maternal deaths, because no abortion-related deaths were reported. That is an easy bias to identify but there may be other, less obvious biases. For example, the anomalously high level (even for India) of maternal deaths from anemia is puzzling. In any case, we know that the distribution of medical causes of death is skewed in this data set. To provide a better picture of the medical causes of maternal death, other study methods (e.g., a RAMOS study) would be more appropriate.

While the high level of under-reporting of maternal deaths is not unusual, there are several important findings in terms of the reporting process. One is that very few maternal deaths were reported by the government health facilities studied. A common explanation for this might be that women with complications are staying at home and dying there or en route to the facility. Our data, however, shows that this is not a valid explanation, as many women are reported to have died in facilities but these deaths were reported by community workers, not the health

facilities. Another reason for under reporting of maternal deaths could be to avoid investigation and punitive action by the higher authorities. However, under the new MDR guidelines, no punitive action policy has been clearly enunciated. Though how far this apprehension has been removed is yet to be seen. This is clearly an area for further study.

Another surprising finding from the death identification process is the high proportion of maternal deaths that were reported by AWWs who are not employed by the health sector. As Table 3 shows, nearly half of all the maternal deaths reported were reported by the AWWs only, as compared to 19 percent by the community health workers (ANMs and ASHAs). Here again, more study would be needed to show why this is so, but there is also the question of whether it is important. Gathering and analyzing information uses up both financial and human resources, so we should choose our research topics carefully, keeping an eye on the likely use of any information we gather.

## **Factors Contributing to Maternal Death**

Combining the data gathered during the interviews with the families of women who had died a maternal death, with the information gathered during the facility “gap assessments”, provides a valuable picture of what families face when a woman develops a serious obstetric complication.

Perhaps one of the most important reasons for doing research is to test our assumptions. Of course, the most damaging assumptions are those that we do not even realize we hold. For example, there has been a great deal of emphasis on community education in the safe motherhood initiative (SMI). Underlying many of these efforts is the assumption that there is something that the community should be doing to avert many of these deaths, such as, recognizing the complication sooner or seeking care sooner. But what is clear from our findings is that:

- Lack of recognition of complications by families was not a major source of delay in seeking care, whereas the difficulty and expense of transporting the woman to a functioning medical facility for help were major factors.
- Life-saving treatment of obstetric complications is generally not offered at the appropriate level of government facilities. Even in the case of women who need surgery, and thus, must be sent to a functioning FRU, there are ways of improving her chances of survival at the PHC level by administering plasma expanders, IV fluids, antibiotics, oxytocics or anticonvulsants before she is referred. However, even these simple remedies were not available at most of the PHCs.
- In most cases, the families tried desperately to obtain medical care for the woman, by traveling to one, then a second and often a third medical facility. Not only did this consume precious time and money (often borrowed) but many of these women also died along the way.

Appendix Table 2 shows the amount of time and money spent at different stages of the journey to seek care among women who had died of different complications. While the numbers dying from a particular complication (and for whom we have in-depth data) are small in some cases (e.g., obstructed labor = 4), there is still some interesting information. For example, in the case of hemorrhage (N=22), the reported average time spent at home deciding to seek care was one hour, compared to 28 hours for obstructed labor. This makes sense since hemorrhage is immediately obvious, whereas, one can see how a family might be tempted to wait a bit longer in the case of prolonged labor, taking into consideration the cost and difficulty of a trip to one of the few hospitals doing cesarean deliveries in the district. Of the four women who had died of obstructed labor and for whom a death audit was done, none had died at home; one had died on the way to the first facility and one each had died in the first, second and third facilities where they had sought care. Of the women with hemorrhage, six had died at home (which is not surprising given how quickly hemorrhage can kill), one on the way to the first facility, and three in the first facility (where there was likely little they could offer, including an oxytocic drug such as Oxytocin or Misoprostol). However, most of the women who had died of hemorrhage, died after leaving the first facility. Three women had even made it to a third facility, only to die there. These women had left home, on average, more than 10 hours earlier and their families had spent an average of Rs. 13,716 (or about US\$ 305).

What is clear from this MDA is that the most important factor in the deaths of these women is the distance they must travel to find a facility that is actually providing life-saving care, whether basic or comprehensive EmONC. There are some indications of delays in either receiving care at the facilities or being referred for higher-level care but the best way to learn about these is from clinical audits in the facilities (of deaths or even of “near misses”). Finding that travel time and cost are major contributors to maternal death is not an unusual finding. What this study makes clear is that the problem is not that women live a long way from a health facility but rather, that the nearby facilities are not providing the treatment they are supposed to. In addition to buying more ambulances and keeping them functional, is the absolute necessity of making sure that government health facilities are functioning at the level they are supposed to and following current government guidelines.

# RECOMMENDATIONS

## Lessons Learned about Conducting an MDA

**It is critical to include non-health community workers in identifying deaths.** In our study, AWWs, being the sole source on information on 47 percent of maternal deaths, as compared to 19 percent for ANMs and ASHAs, two percent for health facilities, and three percent for NGO/PRIs, were by far the best source of information on maternal deaths. Other resources may be needed in urban areas.

**MDAs should not be used to monitor either the level or medical causes of maternal deaths.**

Less than half of the expected maternal deaths in the area were identified, despite our mobilization of community workers and site visits to facilities. Moreover, even the deaths that were identified were not a representative sample, as illustrated by the absence of abortion-related deaths.

## Actions Needed to Reduce Maternal Deaths

**To reduce delay, distance and cost, local and state governments must monitor and improve the performance of EmONC in their facilities.** Although all the facilities were performing deliveries 24/7, most of them did not have even the basic drugs to treat obstetric complications: antibiotics, oxytocics (for hemorrhage), anticonvulsants (for hypertensive disorder). Thus, to obtain treatment, desperately ill women were often taken to a second or even a third facility, often with fatal results.

**State and local governments should map their functioning EmONC facilities and target to upgrade to existing standards, those that should most improve access to services.**

If the women in our study had been able to receive treatment or medical stabilization at the PHC/ CHC nearest to them and even if they needed to be referred for surgery, many deaths would have been prevented.

**Priority should be given to reducing deaths from hemorrhage.** Given the high levels of anemia in India and the role of blood transfusion in multiple obstetric emergencies, blood transfusion facilities need to be more widely available than just at the DH and FRUs. Appropriate facilities, based on geographical location, proximity to the population, staffing, and delivery load could be selected to provide for emergency blood transfusion. This single recommendation alone could avert many maternal deaths. It is equally important to manage the third stage of labor more effectively in health facilities. Finally, there is a growing body of research showing that making the drug Misoprostol more widely available (including by front-line workers and even in homes) can help prevent a substantial proportion of postpartum hemorrhages.<sup>17</sup>

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<sup>17</sup> Walraven G et al. 2005. Misoprostol in the management of the third stage of labor in the home delivery setting in rural Gambia: a randomised controlled trial. *BJOG* Volume 112, Issue 9, pages 1277–1283.

**Community education activities for maternal survival should be tailored to local needs and realities.** Among the 28 women about whom we have this information, only one planned to deliver at home. In most cases, their families recognized the seriousness of their condition and did everything they could to get them help, including borrowing substantial amounts of money. But the women died anyhow, many of them because they did not get appropriate care at the first, second or even third facility they went to. Thus, we are meeting the women only halfway with functioning, accessible services.

## FIELD DIARY

### THE (JOY AND) PAIN OF CHILDBIRTH....STORIES FROM UNNAO

Maternal deaths are not just another statistic to quantify the country's health scenario. It speaks of the precious lives lost due to causes which can be easily prevented. Nothing can be more tragic than losing precious lives to unskilled care, lack of accountability and deficient health services. Presented below is an account of occurrences from the field which were recorded while undertaking the MDAs.

#### VIDYA

***Humare sukh ki bagiya ujad gayee (our world of happiness is torn apart)***...is what *ammaji* (Vidya's mother in law) has to say about her family after Vidya's death. Vidya is one of the many women who died during childbirth.

Vidya had a swelling in her feet during the last trimester of her pregnancy. She was given medication by a local village doctor. Three ANC check-ups were done in the CHC village by the ANM. Vidya was provided advice on nutrition and was given tablets to consume. All earlier deliveries had been conducted at home with support from the local *dai* (TBA) in the village. This time also, Vidya had a normal delivery at home, with the help of relatives. The child was delivered safely and given goat's milk and honey immediately. Mother's milk was given only on the third day.

On the day of the delivery, Vidya reported that she was feeling unwell with fever and dysentery. This condition continued for another six days and all the while that Vidya was at home and the family assumed this condition was normal. On the seventh day, Vidya started shivering. She was then taken to the doctor where she was given glucose, medicines and injections. However, she remained unconscious and did not open her eyes. After that, she was transferred to Unnao CHC where she was examined by a doctor. She was admitted to the hospital and then referred to the women's hospital (*zanana* hospital). Doctors informed the family about Vidya's anemic status and her husband was asked to arrange for blood at the earliest. Within an hour of her admission in the *zanana* hospital, Vidya started rolling her eyes and doctors gave her an injection. The doctors then informed the family that her case was beyond them and asked the family to take her back. Vidya died soon after. Vidya is survived by her husband, her two small children and her in-laws.

Vidya's family was not aware of the JSY scheme. The AWW in the area is inactive and does not make regular home visits. Men in the community have no information about women's reproductive health and other benefits and entitlements offered by the government. *Ammaji* has cataract and finds it difficult to manage the house and the children in the absence of her

daughter in law. The family is under a huge debt which is as close to Rs. 65,000 (US\$. 1,450), borrowed for Vidya's treatment. Most of this amount which had been borrowed from close relatives and community members was spent on her hospitalization.

Vidya's death could have been averted had she been taken to the hospital on time and provided early care for the complications she had to face after childbirth.

### **SUNEETA**

Suneeta was elated about her fourth pregnancy and so were the rest of the family members. Earlier she had delivered two daughters who were now aged 10 and 7 and then a son, now aged 3 years. All her deliveries had been normal and conducted at home. Suneeta had undergone all three ANC check-ups and was found to be severely anemic. Her family decided to take Suneeta to the PHC for delivery. The diagnosis recorded was 'full term pregnancy with the risk factors of short stature and bleeding.' Her blood pressure was recorded as being borderline with a normal fetal heart rate and pregnancy size of 32-34 weeks. Since Suneeta had antepartum hemorrhage, she was transferred to the next hospital as the PHC lacked blood transfusion facility. Unfortunately, as the other hospital also did not have any arrangements for blood transfusion, she was referred to the tertiary care center. Investigations at Kanpur hospital revealed her hemoglobin count was only 2.7 gm/dl. Suneeta delivered a stillborn baby on the third day. The swelling in her body continued and she was eventually brought home. On the 14<sup>th</sup> day of delivery, Suneeta died.

Suneeta was severely anemic and the delay in blood transfusion was a major cause for her death. This death could have been averted had she been transferred in time to the health facility providing blood transfusion.

The family lacked information on JSY and other health schemes. Suneeta's family has spent around Rs. 75, 000 on this treatment. They sold their jewelry and other assets and borrowed money from their relatives. Her family members (especially the men) complained about the impolite behavior of the ANM, and lack of support provided by the health workers in the community. According to them, Iron Folic Acid (IFA) tablets are neither distributed by the ANMs, nor do the ASHAs and the ANMs provide health information. They are seen to be most active only during the pulse polio immunization drive.

### **ASHA**

***"The day we decided to consult a doctor, it was too late. By the time I reached the nursing home nearby, Asha was dead..."*** recalls Asha's husband.

Asha had no idea that she was carrying twins in her fifth pregnancy. It was only in the 6<sup>th</sup> month that she realized it. During the last trimester of her pregnancy, Asha developed a swelling in her body and felt physically weak. The family assumed that soon after delivery, this would become normal and that she would feel better. Asha did not undergo any ANC checkups. She delivered twins at home, but both babies died within a month's time. Her twin daughters were born alive, however, one survived for 10 days and the other for over four weeks. After delivery, the

placenta did not come out for more than an hour which resulted in heavy bleeding. The family soon called for the ASHA who insisted upon taking her to the doctor. Asha's husband went to call the local doctor and by the time he reached the hospital nearby, Asha had passed away. The main cause of this death was postpartum hemorrhage (PPH) which could not be managed at home. In addition, as this was a high risk pregnancy, awareness about delivering at the health facility could have helped save her life.

After Asha's death, her elder daughter Nisha takes care of her younger siblings, and cooks for the family. Her brother and her father work outside the home and in the field.

Asha's husband felt he was not well informed about this wife's needs and health issues, therefore, he was not in a position to take appropriate action. ***"Aurat ke bare mein kya salah denge, humko to hamara hi nahin maloom hai"..... (what will I advise, I know nothing about my own health, what to talk of women's health)*** says Asha's husband.

Previously deliveries were conducted at home, and were assisted by older women and relatives. However, after Asha's unexpected death, the community has become more cautious. All women register for ANC and most prefer going to the hospital for delivery. Nowadays, most deliveries in the community are conducted in the DH and under the JSY scheme, families get Rs. 1,400 as benefits. There are no services at the block health center at night, therefore, patients are not referred to the block health center.

#### **PAPPI**

Pappi looked healthy during her pregnancy, and did not feel comfortable about visiting the health facility for regular check-ups. Her immunization was done in the AWC by the ANM. Pappi had severe anemia and edema. She was advised to visit the doctor, but Pappi felt shy about it.

During her third trimester, Pappi experienced convulsions. Closer to her delivery the family made arrangements to transfer her to the nearest health facility. Pappi was admitted to a private nursing home for 11 days where the doctors identified it as a 'serious case', though the family could not describe the condition. ***"We were asked to deposit Rs. 50,000 and were told that it is a serious case and there would be no responsibility if she dies"***...recalls Pappi's father-in-law.

Pappi was then moved to a government hospital where she was kept for 24 hours. From there she was again moved to a private clinic, as there was no facility at the government hospital for operations. Doctors attended to her after 24 hours. A lower segment cesarean section (LSCS) was done and the baby was delivered stillborn. Pappi was unconscious even after the LSCS. She was referred to the tertiary care center but she never regained consciousness and died at the facility.

In this case, eclampsia could not be managed effectively. The family spent around Rs. 80,000 on Pappi's treatment, which had been arranged through family and friends in the village. The family will have to work hard to pay back the debt.

### **GANGAJALI**

Gangajali had slightly better living conditions and family support. However, she suffered from the same fate as many other women. She too died during childbirth. Gangajali underwent the three ANC checkups at the AWC, which is at a short distance from her house. When she experienced pain she was taken to the PHC where a stillborn child was delivered.

This was also a case of anemia and eclampsia. There was complete failure to provide blood transfusion, management of eclampsia and lack of postnatal care.

### **USHA**

Collapsed walls, a leaking roof, and dismal living conditions best describes the place where Usha once resided with her husband and her children.

Usha did not undergo any ANC check-up and only visited the hospital during her full term pregnancy. During her pregnancy she was examined by relatives and Usha delivered her baby at the PHC. She was physically weak and her labor pains started at home. She was referred to the higher facility which did not have any blood transfusion facility. The attendants advised surgery, and Usha was then taken to the tertiary care center where she died. This was diagnosed as a case of obstructed labour. There was also delay in transporting her to the nearest health faculty.

Usha is survived by her husband and two daughters aged 10 and 6 years. With the support of his mother, Usha's husband is managing the home and bringing up his daughters.

### **RAJNI**

All through her pregnancy, Rajni was severely anemic and was undergoing regular ANC checkups. Her hemoglobin count was as low as 7 gm/dl. She was admitted to a hospital in Unnao district where the doctors informed her family about the abnormal position of her baby and advised her to come to the hospital for delivery. However, when Rajni went into labour, the family called for a *dai* (TBA) and the child was delivered stillborn at home. After delivery, Rajni suffered from high fever and severe headaches. The family then decided to take her to the hospital, and while being transferred, she died on the way.

Rajni, being an ICDS helper, was responsible for helping the AWW in providing basic services to women and children in the community. She was also the sole earning member of the family as her husband did not have any occupation to earn a livelihood. After Rajni's death, the entire responsibility of the household rests on her younger daughter, who had to leave school to attend to the family needs. Now Rajni's husband is a daily wage earner and runs the family on his meager income.

## **KAMLESH**

Kamlesh was taken to the AWC for immunization and was advised to go to the hospital for delivery. The family could not transfer her to the hospital in time due to non-availability of transport. As a result, the child was born at home, the delivery being conducted by her mother in law. In the earlier pregnancies also, all the children had been born at home. Soon after the delivery, a doctor from the community was called to examine Kamlesh, as she was bleeding profusely. The doctor immediately gave her an injection.

Later the *jhaad phoonk baba* (traditional witch doctor) was called to examine Kamlesh. After this, she was taken to the health facilities in Hasanganj and Lucknow. She became delirious and started uttering strange words which the family could not understand; thereafter, she was brought home in an unconscious state and later, she died.

During this process, the family had borrowed money from their relatives and other community members and had sold grains to arrange for resources for Kamlesh's treatment. Her husband now lives and works in Mumbai and the children are taken care of by her in-laws and her extended family.

## APPENDICES

**Table A1. Block wise yearly estimated and reported maternal deaths and the study universe**

	Type of Facility	Population	Estimated births	Estimated maternal deaths	Maternal deaths reported from all sources	Maternal deaths June 2009 - May 2010	Sampled	Verbal autopsied
Asha	Block PHC	147,758	3,280	12	10	9	4	3
Auras	Block PHC	144,000	3,197	11	10	2	1	1
Bagharmau	CHC	187,500	4,163	15	8	5	2	2
Bichiya	Block PHC	172,843	3,837	14	18	14	6	5
Bighapur	Block PHC	148,000	3,286	12	10	8	3	1
Fatehpur Chaurasi	Block PHC	180,491	4,007	14	8	6	3	2
Ganj Muradabad	Block PHC	150,000	3,330	12	16	14	6	4
Hasanganj	FRU	200,969	4,462	16	16	13	6	5
Hillauli	Block PHC	191,000	4,240	15	10	8	4	4
Miyaganj	CHC	217,786	4,835	17	18	14	6	6
Nawabganj	FRU	167,000	3,707	13	10	6	3	3
Purwa	CHC	163,585	3,632	13	16	15	7	5
Safipur	CHC	168,000	3,730	13	14	8	4	4
Shuklaganj City	Urban	467,283	10,374	37	5	2	1	0
Sikanderpur Karan/Achalganj	Block PHC	69,343	1,539	6	10	8	4	3
Sikanderpur Sarosi		25,790	573	2	18	15	7	6
Sumerpur	Block PHC	164,330	3,648	13	7	4	2	2
Unnao city	Urban/ FRU	144,917	3,217	12	3	2	1	1
<b>Whole district</b>		<b>3,110,595</b>	<b>69,055</b>	<b>248</b>	<b>207</b>	<b>153</b>	<b>70</b>	<b>57</b>

**Table A2 a-e. Time, distance and cost of seeking EmONC, by cause of death, Unnao district, Uttar Pradesh, 2010-2011**

<b>a: Hemorrhage</b>	Home	Trip	Facility 1	Trip	Facility 2	Trip	Facility 3
N = 22	6	1	3	5	3	1	3
Mean time spent to decide (hours)	1		1.5		1		
Mean time to make arrangements / travel (hours)	2		2		1		
Mean travel time (hours)		1		1.25		1.25	
Mean distance (km)		11.87		28.50		33.50	
Mean duration of stay (hours)			4		3		1.5
Mean cost of transport (rupees)*		254		1,302		682	
Mean cost of care (rupees)*			1,989		17,425		12,160

\* Rs. 45 = US\$1

<b>b: Anemia</b>	Home	Trip	Facility 1	Trip	Facility 2	Trip	Facility 3
N = 15	4	2	1	3	3		2
Mean time spent to decide (hours)	4.5		4		0.5		
Mean time to make arrangements / travel (hours)	4		1		12		
Mean travel time (hours)		1.25		1.25		1	
Mean distance (km)		12		35.33		22.50	
Mean duration of stay (hours)			5		14		3
Mean cost of transport (rupees)*		228		475		550	
Mean cost of care (rupees)*			1,114		6,760		11,250

\* Rs. 45 = US\$1

<b>c: Sepsis (N=8)</b>	Home	Trip	Facility 1	Trip	Facility 2	Trip	Facility 3
N = 8	2			1	1		4
Mean time spent to decide (hours)	3		37		24		
Mean time to make arrangements / travel (hours)	5.5		10		2		
Mean travel time (hours)		1.25		2.5		3.25	
Mean distance (km)		21.33		49.83		51.67	
Mean duration of stay (Hours)			53		32		56
Mean cost of transport (rupees)*		116		911		1,833	
Mean cost of care (rupees)*			4,216		3,630		19,000

\* Rs. 45 = US\$1

<b>d: Obstructed labor</b>	Home	Trip	Facility 1	Trip	Facility 2	Trip	Facility 3
N = 4		1	1		1		1
Mean time spent to decide (hours)	28		1		0.5		
Mean time to make arrangements / travel (hours)	3.3		1		0.5		
Mean travel time (hours)		1		1		0.75	
Mean distance (km)		6.3		27.5		30	
Mean duration of stay (hours)			3.5		1		0.5
Mean cost of transport (rupees)*		260		1,400		400	
Mean cost of care (rupees)*			400		175		500

\* Rs. 45 = US\$1

<b>e: Hypertensive disorder</b>	Home	Trip	Facility 1	Trip	Facility 2	Trip	Facility 3
N = 6	1	2	1			1	1
Mean time spent to decide (hours)	4						
Mean time to make arrangements / travel (hours)	1		1.7		15		
Mean travel time (hours)		1.5		1		0.2	
Mean distance (km)		10.5		30		5	
Mean duration of stay (Hours)			13		72		
Mean cost of transport (rupees)*		500		1,400		500	
Mean cost of care (rupees)*			25,000		2,000		

\* Rs. 45 = US\$1



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