

**ORIGINAL ARTICLE****Maternal mortality in Ambo Hospital: a five year retrospective review**<sup>1</sup>Herpassa Garomssa and <sup>2</sup>A.D.Dwivedi**Abstract**

**Background:** All pregnant women are at risk of obstetric complications and most of these complications occur during labour, delivery and in the immediate post-partum period that leads to maternal deaths.

**Objective:** The aim of this study was to analyze the magnitude, causes and identify preventable factors leading to maternal mortality at Ambo Hospital, Ethiopia.

**Methods:** This was a retrospective study conducted in Ambo Hospital, Western Shoa, Ethiopia, from January 2001 to December 2005. Ambo Hospital is a zonal general hospital serving more than 2.5 million people. It has four major departments: obstetrics and gynecology, surgery, internal medicine and pediatrics. Clinical records of patients were reviewed to evaluate causative and contributing factors leading to maternal deaths. An independent obstetrician evaluated whether the cause of death was preventable or not.

**Results:** There were seventy three maternal deaths during the study period. The major causes of maternal deaths were hemorrhage in 54.8 % (40/73) of women, puerperal sepsis in 30.1% (22/73) of women, hypertensive disorders in pregnancy in 12.3% of women (9/73), and hepatic encephalopathy in 2.7% (2/73) of women. The maternal mortality ratio was 1,852/100,000 (73/3,941) live births. Of all the maternal deaths 97.3% (71/73) were direct obstetric causes while only 2.7% were due to indirect obstetric causes. Of all the maternal deaths only 11% (8/73) were booked for antenatal care. The distance from hospital to the residences of women who died was within 250 kilometers (in the range of 500 meters to 250 kilometers).

**Conclusion:** Obstetric hemorrhage, puerperal sepsis and hypertensive disorders in pregnancy are still the major causes of maternal mortality and most of these maternal deaths are preventable. There is a need to strengthen relevant reproductive health services and projects in the area to further improve the maternal health situation.

Keywords: Obstetric complications, Prevention of maternal mortality, Avoidable maternal losses.

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## Introduction

Global maternal mortality statistics reflect the widening gap between the developed and developing countries. It is estimated that 99 % of the maternal mortality is in developing countries and the underlying cause for these deaths are poverty, inadequate, inaccessible, or unaffordable health care, unequal access to resources, low status of women, inadequate information and lack of knowledge of recognizing danger signs (1).

Maternal mortality has been recognized as a public health problem in developing countries, as evidenced by an increasing number of publications on the magnitude and significance of the problem (2). In addition, efforts are now being made to sensitize health policy makers so that reducing maternal mortality becomes their top priority. National estimation of maternal mortality in most developing countries is based on limited data. This problem is most prominent in countries with higher mortality where the majority of deaths go unregistered. Where vital registration systems exist, confidential inquiries into the causes of maternal deaths have been very useful in assessing the level of underreporting of maternal deaths and the magnitude of the maternal mortality problem (3).

More than 80% of maternal deaths worldwide are due to five direct causes: hemorrhage, sepsis, unsafe abortion, obstructed labour and hypertensive disorders of pregnancy. Indirect causes are due to medical conditions that in association with pregnancy precipitate fatal outcome - for instance malaria, hepatitis, and HIV/AIDS (4). In

Ethiopia, according to a community based study; the main direct causes of maternal deaths were abortion, hemorrhage, and eclampsia and the principal indirect cause was infectious hepatitis (5).

Accurate assessment of the magnitude of maternal mortality is extremely difficult. The lack of data on maternal mortality has hampered the development of appropriate health policies and interventions, particularly in countries where maternal mortality is highest. At present, international organizations, national governments, and health professionals are becoming increasingly aware of the "neglected tragedy" of maternal mortality (6, 7). They are calling for more and better data management in order to be able to determine its levels, causes, and to intervene accordingly and monitor progress for preventing maternal mortality (8, 9).

The aim of this study was to assess the magnitude and causes of maternal mortality in the study area.

## Methods and Materials

With the objective to determine the magnitude and causes of maternal mortality, a retrospective study of all maternal deaths in Ambo Hospital, western Shoa, Ethiopia, was conducted between January 01, 2001 and December 31, 2005. All clinical records from a logbook and charts of women who delivered and treated in the hospital during the study period were reviewed. The charts of all women who had died during the study period in the hospital due to complications of pregnancy and childbirth were included for review.

Maternal deaths that occurred out of the study period and women whose clinical records were lost were excluded from the study. A structured questionnaire designed for this study was used to collect all relevant information. Socio-demographic and clinical variables such as age, gravidity, parity, address, admission, diagnosis, date and time of death, and causes of death were documented. Data was entered, coded, cleaned and analyzed by using EPI-INFO version 6 statistical package. Statistical tests like Chi-square were used as appropriate. P- value less than 0.05 was considered significant.

## Results

Over the period of five years, from Jan 1, 2001 to Dec 31, 2005, there were 73 maternal deaths, 3,941 live births and 370 stillbirths in Ambo Hospital making the overall maternal mortality ratio (MWR) of 1,852 per 100,000 live births. The highest recorded was in 2001 at which time there were 24 maternal deaths and 602 live births making maternal a MWR 3,986 per 100,000 live births. The lowest recorded was in 2004 with a MWR of 671 per 100,000 live births. (Table 1).

**Table 1: Trends of maternal mortality, Ambo Hospital 2001 - 2005**

Year	Maternal death	Total delivery	Total live birth	MMR / 100,000
2001	32.9% (24)	659	602	3,986 / 100,000
2002	12.3% (9)	867	798	1,227 / 100,000
2003	24.7% (18)	818	749	2,403 / 100,000
2004	8.2% (6)	975	894	671 / 100,000
2005	21.4% (16)	992	900	1,777 / 100,000

Age and parity analysis of maternal mortality (Table 2) shows that 30.1% of the maternal deaths are in the nulliparas and 41.1% of them are in the parity group of 2 - 4. However, 30.1% of all the maternal deaths occurred among primiparas and in 26.0% in the grand multiparas, which are recognized as high risk groups for poor pregnancy outcome. Of all the maternal deaths, 52.1%, i.e. more than half occurred among the age group 20 - 29 years of age which were considered to be low risk groups for poor maternal outcome of pregnancy. In this

study, 41.1% of all the maternal deaths occurred in the age group of 30 and above while only 6.8% of the deaths occurred in the group of 20 and below.

**Table 2: Age and parity distribution of maternal deaths in Ambo Hospital, 2001-2005**

Age	Parity				Total
	0	1	2-4	5 or >	
19 or <	4	-	1	-	6.8% (5)
20 - 24	14	1	6	-	28.8% (21)
25 - 29	2	-	13	2	23.3% (17)
30 - 34	1	1	8	7	23.3 (17)
35 - 39	1	-	2	8	15.1% (11)
40 or >	-	-	-	2	2.7% (2)
Total	30.1% (22)	2.7% (2)	41.1% (30)	26% (19)	100% (73)

Among all the maternal deaths only 11% had antenatal care while 38.4% of them didn't have antenatal care. However, for 51.6% of them their antenatal booking record was missing. Of all the maternal deaths 97.3% were direct maternal deaths while only 2.7% were due to causes not directly related to pregnancy. Of the direct maternal deaths hemorrhage constituted the commonest causes of maternal mortality (54.8%) followed by puerperal sepsis (30.2%) and hypertensive disorders of pregnancy (12.3%). Uterine rupture was the underlying cause of hemorrhage while

obstructive labor and unsafe abortions were the underlying causes for sepsis. Table 3 shows the trends of specific causes of maternal mortality as a proportion of all maternal deaths during the study period. Ruptured uterus served as the major underlying cause of hemorrhage throughout the study period except in 2004. Puerperal sepsis was the second most common cause of maternal deaths. Unsafe abortion contributed the lowest proportion for maternal deaths throughout the study period.

**Table 3: Trends of major causes of MMR as a proportion of all deaths, 2001 - 2005**

	Ruptured uterus	Unsafe abortion	Hemorrhage	Puerperal sepsis	Preeclampsia/ Eclampsia	Others	Total
2001	41.6% (10)	8.3% (2)	20.8% (5)	12.5% (3)	12.5% (3)	4.1% (1)	100% (24)
2002	55.5% (5)	11.1% (1)	11.1% (1)	22.2% (2)	-	-	100% (9)
2003	27.8% (5)	11% (2)	16.7% (3)	33.3% (6)	5.5% (1)	5.5% (1)	100% (18)
2004	-	-	33.3% (2)	16.7% (1)	50% (3)	-	100% (6)
2005	31.25% (5)	-	25% (4)	31.25% (5)	12.5% (2)	-	100% (16)

Age and parity analysis for specific causes of maternal mortality showed that majority of deaths are due to uterine rupture and all occurred among the multiparas. Over 50% of women in the age group 20 to 29 years died from

obstetric complications and hemorrhage was the leading cause of death (Table 4). About 80% of maternal deaths due to hypertensive disorder of pregnancy occurred in the primiparas (Table 5).

**Table 4: Distribution of causes of maternal death by age, Ambo Hospital, 2001 - 2005**

Age	Obstetric Complications							Total
	Ruptured uterus	Unsafe abortion	Hemorrhage	Puerperal sepsis	Eclampsia	Indirect cause		
15-19	4% (1)	-	-	11.8% (2)	22.2% (2)	-	6.8%(5)	
20-24	16% (4)	60% (3)	7.1% (1)	35.3% (6)	55.6% (5)	100% (2)	28.8% (21)	
25-29	16% (4)	20% (1)	64.3% (9)	11.8% (2)	11.1% (1)	-	23.3% (17)	
30-34	32% (8)	-	28.6% (4)	29.4% (5)	-	-	23.3% (17)	
35-39	24% (6)	20% (1)	7.1% (1)	11.8% (2)	11.1% (1)	-	15.1% (11)	
40 or>	8% (2)	-	-	-	-	-	2.7% (2)	
Total	100% (25)	100% (5)	100% (15)	100% (17)	100% (9)	100% (2)	100% (73)	

**Table 5: Distribution of causes of maternal death according to parity, Ambo Hospital, 2001-2005**

Parity	Obstetric Complications							Total
	Ruptured uterus	Unsafe abortion	Hemorrhage	Puerperal sepsis	Eclampsia	Indirect cause		
0	-	60% (3)	13.3% (2)	52.9% (9)	77.8% (7)	50% (1)	30.1% (22)	
1	-	-	-	5.9% (1)	-	50% (1)	2.7% (2)	
2-4	56% (14)	20% (1)	53.3% (8)	17.6% (3)	11.1% (1)	-	37% (27)	
5 or >	44% (11)	20% (1)	33.3% (5)	23.5% (4)	11.1% (1)	-	30.1% (22)	
Total	100% (25)	100% (5)	100% (15)	100% (17)	100% (9)	100% (2)	100% (73)	

Table 6 depicts the distribution of maternal deaths by road distance from the stated address of mothers from Ambo Hospital. About 46.6% of the mothers came from within a distance of 100 km, from Ambo hospital, 45.2% came from within 100 - 250 km, and in 8.2% of the

cases, the address of the mothers were not registered. When we look at the time of hospital stay, nineteen mothers (26%) died within less than one hour of hospital stay after arrival and twenty (27.4%) mothers died within 01 - 12 hours of hospital stay.

**Table 6: Distribution of maternal deaths by distance of address from Ambo hospital**

Address	Distance in kilometer	Number of maternal deaths	Percentage of maternal deaths
Ambo town	< 01	4	5.5%
Ambo, Dandi, Tikur woreda (district)	1-50	17	23.3%
Jalidu, Ejere, Walmera, woreda	51-100	13	17.8%
Chaliya, Adeaberga, Dano woreda	101-150	14	19.2%
Metarobi, Gindeberet woreda	151-200	12	16.4%
Horo woreda	201-250	7	9.6%
Address not traced		6	8.2%
Total		73	100%

## Discussion

This study provided an overview of the maternal mortality status in a rural hospital setting. Health institution based MMR are considered higher than community rates because of the high risk status and complicated cases of mothers delivering in hospitals. The overall MMR of 1,852/100,000 live births is considerably higher than the 671/100,000 live births of the national maternal mortality reported in the year 2005 Ethiopian Demographic Health Survey (10). The MMR estimated in this study is well comparable with a study done in Jimma hospital which was 1,965/100,000 live births (11). According to Mekbib et al, at Ambo Hospital, patients with obstructed labor comprised 39% of all obstetric patients making the leading cause of hospitalization followed by obstetric hemorrhage which was 24% of all admissions (12).

The Ethiopian Society of Obstetricians and Gynecologists in collaboration with the International Federation of Gynecology and Obstetrics (FIGO) conducted the "Save the Mothers Project-Ethiopia" in West Shoa Zone Ambo Hospital from 1998 to 2003 with the objectives of reducing maternal deaths by promoting the availability, access and utilization of emergency obstetric care (EmOC) services for women with complications of pregnancy and childbirth (12). During this period the case fatality rate (for direct maternal deaths) decreased from 7.2% at baseline to 4.6% at endline showing a definitive trend of improvement. The maternal mortality in this rural hospital is surprisingly much higher than that found in Addis Ababa hospitals which was 1,028/100,000 live births in 1995 and

999.4/100,000 live births in 1999 (13, 14). The obvious problem in generalizing from hospital-based studies is that only selected sample of women deliver in a hospital and more women who are suffering from serious complications of pregnancy are more likely to be hospitalized.

Among all the maternal deaths, primiparas and grand multiparas contributed to the majority of maternal deaths. In primiparas the major cause of maternal death was puerperal sepsis with the underlying obstructed labour followed by eclampsia. In grand multiparas the major cause of maternal death was obstructed labour resulting in ruptured uterus. These parity groups are a possible target area for intervention to reduce maternal mortality. This is also in agreement with studies done under similar settings (15, 16).

The direct obstetric causes of maternal deaths in this study are hemorrhage, sepsis and hypertensive disorders of pregnancy and remain to be major causes of maternal mortality as demonstrated in similar studies from developing countries. Like the study from Jimma Hospital which found ruptured uterus to be responsible for the leading cause of maternal deaths (33.2%), this study also showed uterine rupture being responsible for 34.2% of maternal deaths. On the contrary, the contribution of unsafe abortion for maternal death was found to be very low in this study compared to other studies.

Among the 73 maternal deaths only eight (11%) had ANC, 28 (38%) had no ANC and for the rest ANC status was not mentioned.

Four mothers who died were from Ambo town and 69 mothers were from outside Ambo town. Among all the mothers who were from outside of Ambo town only 37.7% were referred from a health institution while the rest were self-referrals. Of these mothers who came from outside Ambo town 43.5 % (30/69) came from a distance of within 100 kilometers and 47.8% (33/69) had to travel a distance of 101 - 250 kilometers seeking medical care in the hospital.

Nineteen out of seventy three mothers (26%) died in less than an hour of arrival in the hospital. This definitely contributed to the high figure of the MMR of the hospital, and inclusion of these deaths in the calculation could be debatable.

There are factors that contribute to delay in preventing deaths among women with obstetric complications. Obtaining medical care for women with obstetric complications begins with the recognition of danger signs. Access to such information and understanding of the gravity of symptoms, such as bleeding or prolonged labour; help a woman and her family to seek timely treatment. Even when women and their families recognize danger signals and understand the need for medical care, they believed that there was nothing much that the medical facility could do for her. The reasons being no trained doctor or nurse-midwife, blood and oxygen supply shortages were regular and equipments remaining frequently nonfunctional. These are facts round the year in many of health facilities in the country. Thus people didn't bother to seek medical care when they believed that their patient probably will not be cured, or even likely to die in the hospital (17, 18, 19).

A consensus exists within the international community that maternal mortality can be reduced by the provision of the following four elements: 1) Skilled attendance at all births, 2) Basic EmOC in peripheral units, 3) Comprehensive EmOC in referral hospitals, and 4) Rapid transport of women in need of special care (20).

The death of a woman in childbirth is a tragedy, an unacceptable and wasteful event that carries with a huge burden of grief and pain. Pregnancy is not a disease and pregnancy related morbidity and mortality are preventable. Maternal mortality as shown in this study is unacceptably high and women continue to suffer from pregnancy related complications that are preventable mainly because of a failure at the peripheral health units in managing obstetric emergencies. The major causes of maternal deaths in this study are hemorrhage with the underlying causes of uterine rupture and postpartum hemorrhage, sepsis due to prolonged and obstructed labour, and hypertensive disorders of pregnancy. The reason behind this is the persistent tradition of deliveries in domiciliary settings in unsafe and unhygienic conditions by untrained or poorly trained birth attendants.

Lack of awareness about obstetric emergencies among women and community combined with inaccessible terrain and lack of emergency transportation significantly contributed towards avoidable and unnecessary deaths. To mitigate the problem effectively at all levels, planning and execution of an effective interventional strategy is required. Improving maternal care services, referral systems and transportations like ambulances from

peripheral clinics to the hospital is a possible strategy among others.

This study has its own limitations and showed only the “tip of the iceberg”.

Therefore, a larger study for reviewing and auditing all maternal deaths in the country is recommended to develop effective strategy to address this serious problem.

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**References:**

1. A.P. Abyeji. Trends in maternal mortality in Ilon, Nigeria. *Intl. J. Gynecol Obstet.* 1998; 63: 183-184.
2. J. Ties Boema. Levels of maternal mortality in developing countries. *Primary health care, UNICEF/WHO.* 1987;18 (3): 213 - 221
3. F. Donnay. Maternal survival in developing countries: what has been done, what can be achieved in the next decade *Intl. J. Gynecol Obstet.* 2000;70: 89 - 97.
4. Shamshad Begum, Aziz -un-Nisa, Iqbal Begum. Analysis of maternal mortality. *Journal of Ayub Medical College, Abbottabad,* 2003; 15 (2).
5. Kwast B.E. A community based study of maternal mortality in Addis Ababa. *Ethiop. Med. J.*1985; 26: 6-7.
6. Family Care International. Safe Motherhood Fact Sheet: Maternal mortality, 2002.
7. Starrs A. Preventing the Tragedy of Maternal Death: A report on the International Safe Motherhood conference. 1987; Nairobi Kenya.
8. World Health Organization (WHO). Women's Health in Pakistan. 1997; 14: 3 -5.
9. Reduction of maternal mortality. World Health Organization Geneva 1999; 77(2):190-93
10. Central Statistical Authority (CSA) and ORC Macro. 2005. Ethiopia Demographic and Health Survey, Addis Ababa, Ethiopia: CSA & ORC Macro.
11. Gaym A. A review of maternal mortality at Jimma Hospital. *Ethiop. J. Health Dev.* 2000; 14 (2): 215-23.
12. Mekbib T, Kassaye E, Debebe A et al. The FIGO Save the Mothers Initiative: the Ethiopia-Sweden collaboration. *Int J Gynecol Obstet* 2003; 81:93-102
13. Frezghi W/Michail. Study of Maternal Mortality in three teaching hospitals. Unpublished document. Addis Ababa, Ethiopia, 1995
14. Assaye Mazgebu. A three years review of maternal mortality in two teaching hospitals. Unpublished document. Addis Ababa, Ethiopia,1999
15. Frost O. Maternal and perinatal death in Addis Ababa hospital. *Ethiop. Med. J.* 1984; 22: 143 -146.
16. Yosef S, Kifle G. A six years review of maternal mortality in a teaching hospital in Addis Ababa. *Ethiop Med J* 1998; 26:115-120.
17. Revised 1990 Estimates of Maternal Mortality; A New Approach by World Health Organization and UNICEF. WHO, Geneva, 1996

18. Ethiopian Society of Obstetricians and Gynecologists. Reasons for under utilization of emergency obstetric services in three woredas of West Shoa Zone, Oromia region, Ethiopia: A qualitative approach, Oct. 2003.
19. Bhatia, Jagdish C. Levels and causes of maternal mortality in Southern India. *Studies in Family Planning*. 1993. 24(5) :310 - 318.
20. World Health Organization (WHO). 1987. Report on Primary Health Care. Nairobi, Kenya.