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DELAYS IN MATERNAL MORBIDITY AND MATERNAL MORTALITY AT FACILITY LEVEL, TIGRAY REGIONAL STATE,

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DECLARATION

I THE UNDERSIGNED, SENIOR MPH STUDENT DECLARE THAT THIS THESIS IS MY ORIGINAL WORK IN PARTIAL FULFILLMENT FOR THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH. ALL THE SOURCES OF THE MATERIALS USED FOR THIS THESIS AND ALL PEOPLE AND INSTITUTIONS WHO GAVE SUPPORT FOR THIS WORK ARE FULLY ACKNOWLEDGED.

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Abbreviations and Acronyms.

AIDS…… … ……Acquired immuno Deficiency Syndrome

DHS…….....Demographic and Health Surveys

DKA……...Diabetic keto acidosis

DSS…….. ……. Demographic Surveillance site

GFR…… General Fertility rate

HIV…….....Human immuno deficiency syndrome

HMIS……....Health management information systems

ICD ……...International Classification of Disease

ICU……..…Intensive care unit

MDR ……..Maternal death review

MDG…….. ……. Millennium Development Goal

MMR…….. ….…….……...Maternal mortality ratio

MMR…….....Maternal mortality Rate

RAMOS. ……Reproductive Age Mortality Study

SOB…….…..Shortness of breath

TFR ……Total fertility rate

UN……..United Nations

UNFPA……..……....United Nations Population Fund

UNICEF …….United Nations Children's Fund

WHO……. ……World Health Organization

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ABSTARCT

Each year, more than 500,000 women world wide die from complications related child birth. With good quality obstetric care, approximately 90 percent of these deaths could be averted. The assistance of skilled birth attendants during labor, delivery and the immediate post partum period is one important component of quality of obstetric care. How ever little is known about the cause of what is known as 'the third delay" the delay in receiving medical attention after a woman arrives at a health care facility.

Through this paper two major things were examined. The objective of the study was to assess the delays in maternal mortality and morbidity and to assess avoidability of maternal deaths. The first were causes and circumstances of maternal deaths that have occurred in hospitals, the second measured the patient delay and the hospital delay in case of emergency obstetric care. The studies were carried out between December 2005- may 2006 in Tigray, Ethiopia. The maternal death audit as well the patient and hospital delay study were facility based. The maternal death audit study assessed each death for the cause and circumstances of deaths, avoidable factors, by utilizing both review of patient and facility records and interviewing those who were involved in the care of deceased woman.

Results shows that 15 (44.1 %) were unavoidable maternal deaths and 12 (35.7%) were possibly avoidable maternal deaths, the leading causes of death were infection 16 (47. 1%) followed by haemorrhage 10 (29.4 %). The review also identified avoidable factors finding that most of these factors related to hospital service or medical factors. Patient factors, transport factors were also noted. Among the hospital factors institutional delay like delay to refer for treatment, lack of blood, delay in transfusion, inappropriate institutional treatment

and substandard care were also noted. The interval between the onset of signs and symptoms and arrival at the facility is measured and operationalized as patient delay and the interval between arrival and initial evaluation is measured as hospital delay but no standards define patient delay and hospital delay. The median (range) for the patient and hospital delays is 8(125) hrs and 0(6) hrs respectively. The qualities of medical records were very poor lacking many key data items and time element was also a rare finding. Based on the findings it is recommended implementing an initiative to improve medical record documentation at all hospitals. This would facilitate medical record review for quality purposes.

It is also recommended a quality improvement approach to strengthen the triage system that is already in place. Maternal death audit as a system need to be institutionalized. Educational campaigns are necessary to raise awareness of the community on danger signs of pregnancy so as to avoid patient delay and in-service training for care providers to avoid hospital delay and mismanagement.

Since no standards define "delays" it was found to be difficult to judge whether delays occurred or not and where the delays has occurred. As a result it is recommended that Evidence based standard should be developed. Further study on the cause of what is known as ‘the third delay” the delay in receiving medical attention after a woman arrives at a health care facility through Patient flow analysis needs to be done

1. INTRODUCTION

1.1. MAGNITUDE OF MATERNAL MORBIDITY AND MORTALITY.

Maternal death is death of a woman while pregnant or with in 42 days of termination of pregnancy, irrespective of the duration pregnancy from any cause related to or aggravated by the pregnancy or its management but not from accidental causes. Death from maternal causes represents leading cause of death among women of reproductive age in most developing countries (1).

Of the estimated 585,000 annual deaths worldwide due to complications of pregnancy and delivery, 99% occur in the developing world. It is estimated that the highest risks from pregnancy occur in Africa, in particular in Eastern and western Africa, with ratios over 1000 maternal deaths per 100,000 live births. Ninety percent of pregnancy related deaths occur in developing countries whilst the world major focus is on methods and strategies to reduce this burden, particularly for women in developing countries; a secondary difficulty arises in that true rates of maternal death at the community level (particularly in societies where most delivered occur at home) remain notoriously difficult to measure meaningfully (2).

In Ethiopia, maternal mortality ratio estimates 871/100,000(3). Only 5% of mothers had been attended at health facility during delivery, pointing to possibility of large maternal death and disability (4).

Every minute, one maternal death occurs somewhere in the developing world. Every year over half a million women, die during pregnancy and following childbirth. Maternal mortality is the tip of the iceberg. For every maternal death, there is 20-30women who suffers severe morbidity (5).

Of all maternal deaths, 80% can be potentially avoided by interventions during pregnancy, childbirth and the postpartum period that are feasible in most countries. The common causes of maternal death include haemorrhage, hypertension, and infection, obstructed labour and unsafe abortion. Unfortunately, national Maternal Mortality Ratios (MMRs) do not tell us the real reasons why mothers die. Also one cannot identify which women or which groups of women or areas within a country have higher rates of maternal mortality. It is therefore important to look beyond the numbers. Each maternal death has a story to tell and can provide indications on practical ways to address the problem. Facility based death reviews is one way of Looking beyond the Numbers which help understand why women die (6).

The ultimate aim of maternal death audit is to improve the standard and quality care of all pregnant women. It is extremely important to understand that in assessing the care one is looking at the care in totality. This includes how the basic things were done, like routine antenatal clinic (ANC) as well as the event that led to the woman's death. The basic structure for detecting defects in health care is to analyze the woman and her environment, the administrative Circumstances and the quality of health care individually (7).

Audit activity is not very resource demanding and is therefore a good starting point for quality assurance in developing countries (8).

1.2. RATIONALE OF THE STUDY

In Ethiopia, previous studies on maternal mortality were determining maternal mortality both at Facility and community level which do not tell us the real reasons why mothers die. Even though the country is moving towards achieving the millennium development Goals there is no national maternal death audit system moreover no single study done on maternal death audit in Tigray. So this study will be a good input to introduce death audit system at facilities as one of the strategies for reducing maternal mortality. Through this study hospital factors contributing to death may be identified and quality of obstetric care can be improved. Information generated through this will be used by the health care system and communities to identify preventable causes of maternal deaths. .

2. LITERATURE REVIEW

2.1. MAGNITUDE AND FACTORS ASSOCIATED WITH MATERNAL DEATHS.

Maternal death is death of a woman while pregnant or with in 42 days of termination of pregnancy, irrespective of the duration pregnancy from any cause related to or aggravated by the pregnancy or its management but not from accidental causes. Death from maternal causes represents leading cause of death among women of reproductive age in most developing countries (1).

A large proportion of maternal deaths may result from poorly managed deliveries, and many such deaths could be avoided if suitable care were given. Of the estimated 585,000 annual deaths worldwide due to complications of pregnancy and delivery 99% occur in the developing world. It is estimated that the highest risks from pregnancy occur in Africa, in particular in eastern and western Africa, with ratios over 1000 maternal deaths per 100,000 live births. (9)

Ninety percent of pregnancy related deaths occur in developing countries whilst the world major focus is on methods and strategies to reduce this burden, particularly for women in developing countries; a secondary difficulty arises in that true rates of maternal death at the community level (particularly in societies where most delivered occur at home) remain notoriously difficult to measure meaningfully (7).

Many interrelated factors contribute to maternal mortality. These include women's low status and lack of decision-making power, lack of information among women and their families on the signs of complications, inability to access care when complications arise, lack of resources to reach an appropriate care facility in time and medical service factors such as delay in treatment, lack of blood and errors of judgment (8).

2.2. STRATEGIES AND CHALLENGES TO REDUCE MATERNAL DEATHS

The continuing high maternal mortality in low resource countries is evidence that there is a need to identify and implement those strategies that are most effective at reducing maternal mortality. In relation to maternal deaths the gathering of information on deaths with a view to finding out why the deaths occur, and what can be done to prevent them, is the key stone of quality assurance strategies (7).

Qualitative and quantitative information is inadequate on maternal deaths and Institutional data, though not an index of maternal care of the nation as a whole; can highlight the magnitude of the problem (10).

Other best ways to reduce maternal mortality are provision of family planning, provision of standard post abortion care, creation of community awareness and mobilization. In the 21st centaury, safe motherhood remains an elusive goal for many developing countries. The obstacle to progress in reducing the burden of avoidable maternal mortality and severe morbidity include both old and new challenges and emphasize the reality of no "quick fix" nor ''magic bullet''. Among the older challenges are some familiar barriers to public health such as dysfunctional health systems, poverty and the low status of women as regards the new challenges foremost is Human immuno deficiency Virus(HIV) (11).

The drastic reduction of maternal mortality observed in developed countries in the early part of the 1900s is attributable to bringing together of the technical requirements like (data systems, professional expertise and access to technologies) with the necessary political will exist and professionals are committed to the cause, similar reductions in maternal mortality

are not taking place in less developed countries. The cause is lack of readiness in the health sector due the insufficient financial, human and organizational resources (12).

The analysis of maternal deaths in developing countries is incomplete due to paucity of data and unsatisfactory record keeping leading to a lack of national level data. (13).

In Ethiopia, like other resource limited countries measuring maternal mortality is complex and resource intensive. Of the different approaches available for measuring maternal mortality. Direct household surveys were conducted in Addis Ababa, where it was necessary to interview more than 32,000 households to identify 45 deaths and produce an estimated maternal mortality ratio of 480. Such household survey is extremely costly (14).

The information or knowledge regarding maternal mortality both quantitatively and qualitatively is not sufficient (15).

The ultimate aim of maternal death audit is to improve the standard and quality care of all pregnant women. It is extremely important to understand that in assessing the care one is looking at the care in totality. This includes how the basic things were done, like routine antenatal clinic (ANC) as well as the event that led to the woman's death. The basic structure for detecting defects in health care is to analyze the woman and her environment, the administrative Circumstances and the quality of health care individually (7).

Audit activity is not very resource demanding and is therefore a good starting point for quality assurance in developing countries (8).

2.3 .FACTORS RELATED TO THE TIMELINESS OF HOSPITAL CARE

In developing countries, timeliness relating to safe motherhood was brought to the fore by three- delay model, which specifies three types of delays that contribute to the likelihood of maternal death in the event of a complication. The first is delay in deciding to seek care, the second is delay in reaching treatment facility and the third is delay in receiving adequate treatment at the facility. While the first two types of delays must be addressed by maternal and community education and other interventions, the third can be addressed only by facility's health care system (16).

Several studies have explored the reasons for in hospital delays in obstetric emergencies in developing countries, revealing factors that contribute to delays in service delivery arrival time, time of day, day of week, fees, diagnosis, personnel, equipment, and drugs and supplies.

With regard to drugs and supplies in west Africa the prevention of maternal mortality network (PMMN) found that drug shortages resulted in many family members being asked to purchase drugs at outside pharmacies and provide supplies(e.g. dressings, intravenous tubing and fluid , suture supplies, surgical gloves) .These requirements delayed care, especially when pharmacies were closed. With regard to personnel two studies in West Africa found that waiting to be seen by a doctor or a specialist along with was lack of drugs and waiting for emergency room caused delays in Benin (17)

2.4.OVERVIEW OF STUDIES DONE ON MATERNAL MORTALITY IN ETHIOPIA.

Vast majority of published studies in the country about maternal mortality attempted determining maternal mortality at facility as an example the study done in Jimma by Asheber Gaym can be mentioned (18) As it is well known hospital based estimates of maternal mortality gives you an inflated figure.

There were also few expensive studies done at community level which is the most frequently cited example for its expensiveness is the study done in Addis Ababa by Kwast and others which was Direct household survey where it was necessary to interview more than 32,000 households to identify 45 deaths and produce an estimated maternal mortality ratio of 480. Such household survey is extremely costly.In addition the study done by Mersha (19) which was community-based study on maternal mortality in Jimma town attempts to determine maternal mortality rate.

All the above mentioned studies attempt to determine maternal mortality. The argument here is what the importance of knowing such unreliable estimates at the expense of the very limited resources in such poor country.

3. OBJECTIVE

3.1. GENERAL OBJECTIVE:

- ✓ To assess the delays in maternal mortality and morbidity

3.2. SPECIFIC OBJECTIVE.

- ✓ To assess avoidability of maternal deaths.
- ✓ To assess the quality of medical and facility records.
- ✓ To determine patient and hospital delays in obstetric emergency.
- ✓ To describe factors that influence delays during an obstetric emergency.

4. METHDOLOGY

4.1. STUDY SETTING AND DESIGN

Facility based audit of the cause and circumstance of maternal deaths and a study on patient and hospital delay in emergency obstetric and labour care were conducted in five zonal public hospitals in Tigray regional state between December 2005 and May 2006.

There are 12 public hospitals in Tigray under the regional health bureau. Five of them were included in this study..Mekelle hospital, a specialized referral teaching hospital, with 230 beds and 226 staffs established in the year 1954 E.C. Midregenet, is a zonal hospital with 130 beds and has of 120 established in the year 1984 E.C; and Lemelem Karl hospital with a total of 190 beds and established in the year 1994 E.C. it has of 155 staff. St. Marry hospital is also a zonal hospital with 130 beds and 226 technical staffs, established in the year 1958 E.C. Adigrat hospital is also a zonal hospital with 130 beds and has 142 staffs.

The hospitals were selected purposively based on the following criteria. A range of levels of care including, one referral hospital with an active maternity department that manages a reasonable number of maternal complications, and at least some facilities outside the capital to get adequate number of recent maternal deaths that provides comprehensive emergency obstetric care at least in the previous 2 years.

The study design was crossectional survey with retrospective data collection approach for the maternal death audit, in the previous two years 2004 - 2005.and prospective data collection approach for the care seeker study

4.2. SOURCE AND STUDY POPULATION.

The source population for the death audit were all hospital maternal deaths in the selected hospitals. The study population were maternal deaths happened in the year 2004 and 2005. The source population for the quantitative part of the study was all emergency obstetric attendants and labouring mothers in the selected hospitals and the study population was emergency obstetric care and labouring mothers in the months of December 2005.

4.3. SAMPLE SIZE DETERMINATION

For the record review 40 maternal deaths were required according to WHO Recommendation (6)

The sample size of the emergency obstetric patients was determined using a single population proportion formula.

$$n_o = (Z_{\alpha/2})^2 \frac{P (1 - P)}{d^2}$$

The following Assumptions were made.

Expected prevalence (p) i.e. proportion of first phase and second phase delay is 50 % , Desired precision (d) = 5% and Confidence interval of 95%, which means α set at 0

Hence, the calculated sample size was 384. Adding a 10 % non-response rate the required minimum sample size (n) was 422.

4.4. SAMPLING PROCEDURES

For the maternal deaths review records of all pregnancy related deaths were the sampling frame then the most recent maternal deaths were selected consecutively. Similarly consecutive patients were selected until the required sample size was obtained from all emergency obstetric attendants and labouring mothers

4.5. IDENTIFICATION OF MATERNAL DEATHS

In identifying maternal deaths, the definition comes first the intention was to apply ICD definition of maternal deaths but in the field it was found out to be difficult to apply strictly the definition of maternal deaths due to unavailability of medical certification of death, then the pregnancy – related death definition with health care worker reporting, facility record review, and patient medical record used to identify maternal deaths.

4.6. DATA COLLECTION

A standard Questionnaire WHO with minor modification was used to review each maternal death, (Appendix one).The principal investigator collected data on 34 hospitals maternal deaths that have occurred in the selected hospitals from December 2005 through January up to February 2006.

Sources of information for the death review included ward and operating theatre registers, antenatal checkupcard, case sheet and interviews with 59 care providers who were involved in the care of the deceased. These include obstetricians, medical doctors, nurses, midwives, health assistants, surgeons and internists.

There were three maternal deaths in which no facility staffs interviewed only medical record and facility record review conducted. Deaths happened with in the previous two years 2004 - 2005 were included.

For the care seeker study in emergency obstetric care, 4 trained professionals' nurses interviewed 401 mothers, with structured questionnaire (appendix two) in the selected hospitals, after the mothers received hospital care.

4.7. DATA QUALITY CONTROL

To assure the quality of the data, properly designed data collection instrument was used. The data collectors were trained and did pretsting of the structured questionnaire until they became well conversant with the instrument. Everyday; all of the collected data were reviewed and checked for completeness and relevance by the supervisors and principal investigator. Accuracy were improved through double entry for the maternal death audit and 10 % of the quantitative parts of the study were reenterd.

4.8. DATA PROCESSING AND ANALYSIS.

Data that that were collected on paper forms were entered on EPI INFO 2000, cleaned, and coded by the investigator, which was then exported to SPSS for further analysis. Double entry for the maternal death audit was employed. Descriptive statistics (means, medians/ percentages) and non-parametric independent t test were employed and for the death audit descriptive statistics employed along with data synthesis and summary. Each maternal death was assessed for avoidable factors by the investigator and facility staffs.

4.9. OPERATIONAL DEFINITION

- ✓ Avoidable deaths are those maternal deaths in which at least one facility staff interviewed admitted its avoidability.
- ✓ Avoidable factors are those factors that contribute to her death and decided by facility staffs interviewed.
- ✓ Patient and family related avoidable factors are factors related to delay to seek care, home delivery while having previous bad obstetric history, Lack of ANC follow up.
- ✓ Medical avoidable factors include misguided action by staffs, staff incompetence, service inadequacy, and institutional delay in treating patients.
- ✓ Transport / Access factors includes if a mother resides in a place where there is no comprehensive emergency obstetric care.
- ✓ Patient delay/ pre hospital delay defined as time from obstetrics emergency symptom onset to arrival at the hospital.
- ✓ Hospital delay is defined as time from arrival at the hospital l until initial examination.
- ✓ Total delay the sum of patient delay / prehospital delay/ and Hospital delay.
- ✓ Skilled birth attendant childbirths attended by health professionals.
- ✓ Initial treatment: Iv- Fluids, CPR (Cardio Pulmonary Resuscitation), Administering drugs (oxytocin, magnesium sulphate, antibiotics), sending Lab Tests (Blood type and cross match, heamatocrit).
- ✓ Definitive treatment: caesarean section, vacuum/ forceps Delivery, Hysterectomy, manual placental removal, blood transfusion, provision of IV- Fluids, laceration repair.

4.10. ETHICAL CONSIDEATIONS.

Ethical clearance was obtained from the Department of Community Health and Faculty of Medicine, Addis Ababa University. Necessary permission was obtained form Tigray regional health bureau and from the hospital, directors and verbal informed consent obtained from the study participants. Confidentiality of study participant's information was also assured; pseudonames have been used in the reporting of the each maternal death.

5. RESULTS

5.1. MATERNAL DEATH AUDIT.

The quality of medical records was assessed in this study. The mean (standard deviation) key data items missing from the charts were 5.74 (1.88). The legibility of medical records was good in 91.2 % of the records and bad in 8.8 % of the records. The mean (S.D) number of entries, entries means frequency of visit each mother had during her stay in each medical record is 4.12 (4.01)

Facility-based reviews of maternal deaths were conducted for 34 deaths that occurred in the five hospitals. 4 (12 %) deaths were from St. marry hospital, 6 (18 %) deaths were from Adigrat, 5 (15 %)deaths were from Midegenet, 9(26%) deaths were from Mekelle, 10(29%) deaths from lemlemkarl hospital as shown in table one.

The mean (standard deviation) age at time of death were 25.7(6.6) as shown in table 1. Nine (26.5 %) of the deaths were in urban residents; where as 25 (73.5 %) were in rural residents. Concerning Religion 27 (96.5 %) were orthodox and 3.6 % were Muslim. The mean (S.D) distance walked to the hospital where they died is 8 hrs (7.369) The mean (standard deviation) of the number of pregnancies the mother had in her life time were 2.2(1.7). Twelve (36 %) of the mothers who are included in this death audit were primi mothers.

Table 1. Socio demographic characteristics of maternal deaths audited, in hospitals, Tigray, May 2006

Characteristics	*Frequency*	*Percentage (%)*
Hospital		
Mekelle	9	26
Adigrat	6	18
Axum	4	12
Shire	5	15
Lemelem Karl	10	29
Age in years		
< 18	7	20.6
19-34	25	73.5
35 and above	3	5.9
Mean (S. D)	25.6 (6.6)	
Range	17-45	
Residence		
Urban	9	26.5
Rural	25	73.5
Religion		
Orthodox	27	76.5
Muslim	1	2.9
No response	6	17.6
Number of Pregnancies		
Mean (SD)	1.4 (3.5)	
Range	0-8	
Distance from Home to Hospital in Hours		
Mean (SD)	8(7.3)	
Range	0-8	

As shown in table 2, 26 (78.8 %) of the deaths were referral case the other 3 (9.1%) were not referral cases and for 4 (12.1 %) of the deaths it is not known whether they are referral case or not, 28 (82.8 %) of the deaths happened after the mother had delivered. Minority, four (10.3%) mothers died before they delivered and in 2 (6.9 %) of the deaths it is not known when they died, either before delivered or not because it was missed from the patient medical records.

Twenty (66.7%) of the deaths happened in mothers with bad previous obstetric history, seven (23.3%) of the deaths were in those who had good obstetric history and for the remaining three (10 %) of the deaths the obstetric history was not known. As far as the main attendant at delivery was concerned, sixteen (57 %) had skilled attendants. Six (21.4 %) had unskilled attendants, one (3.6 %) was attended by both skilled and unskilled attendant, and the main attendant for five (17.9) % of the deaths was unknown.

Avoidability of maternal deaths as to the interviewed clinicians showed that fifteen (44.1 %) were unavoidable maternal deaths and twelve (35.7%) were avoidable maternal deaths.

Table 2, Reproductive history and obstetric history of the deceased woman, Tigray, may 2006

Characteristics	Frequency	Percent
Referral status		
Referred	26	78.8
Not referred	3	9.1
Missing	4	12.1
Died delivered		
Yes	28	82.8
No	4	10.3
Missing	2	6.9
Gestational age at time of death		
Less than 37 weeks	4	13.8
37-42 weeks	24	82.8
Unknown	6	3.4
Obstetric history	3	10
Good	7	23.3
Bad	20	66.7
Missing	3	10
Main attendant at delivery		
Skilled	16	57.1
Unskilled	6	21.4
Both skilled and unskilled	1	3.6
Missing	5	17.9
Avoidability of deaths		
Avoidable	15	44.1 %
Unavoidable	12	35.7%

As shown in table 3 Ante Natal Care follow up revealed that four (12.1%) of them were attending ANC at least once where as eleven (33. 3 %) of them did not having Antenatal check ups and in eighteen (55.5 %) of the mothers it is not known whether they had Antenatal care follow up or not. Seven (20.6%) of the mothers who died were not having postnatal checkups.

General practitioners admitted majority of the deceased woman. Also In this audit the place of delivery were also assessed and revealed that eleven (37.9%) of the deaths happened in those who delivered in hospital, sixteen (55.2%) of them had home delivery and for the remaining two (6.9 %) their place of delivery was not known. The status of the new born also assessed in this study there were still births, twelve (92 %) of the new borns were still births.

Table 3 Health Service Utilization of the Deceased Women Tigray, Ethiopia, and May 2006

Characteristics	Frequency	Percent
Antenatal care at least once		
Yes	4.	12.1 %
No	11	33.3
Missing	18	54.5
Post natal care at least once		
Yes	14	41.2
No	7	20.6
Missing	9	26.4
Na	4	11.7
Place of delivery		
Home	16	55.2
Hospital	11	37.9
Missing	2	6.9
Out come of new borns		
Alive	1	2.9
Dead	12	92
Missing	0	0

Na: not applicable

As shown in table 4, the main cause of Admission was unsafe abortion one (2.9%). Haemorrhage nine (26.5%), infection eight (23.5%). Pregnancy induced hypertension eight (23.5%), obstructed labour eight (23.5 %). Similarly the causes of death were unsafe abortion one (2.9%), Haemorrhage ten (29.4 %), infection sixteen (47.1%), Pregnancy induced hypertension six (7.6 %) and obstructed labour1 (2.9%).

Patient/ Family factors contribute in twenty-six (81.3 %) of maternal deaths, medical factors contribute in eighteen (87.5%) of maternal deaths, transport/ access factors in fifteen (46.9%) of maternal deaths. Together three of the contributing factors namely patient/ family, medical and transport/ access factors were found in nine (30%) of the maternal deaths.

Table 4, Diagnosis at admission, cause and contributing factors of death, in deceased woman Tigray, Ethiopia, May 2006

Diagnosis	Frequency	Percent
Unsafe abortion	1	2.9
Haemorrhage	9	26.5
Infection	8	23.5
PIH	8	23.5
Obstructed labour	8	23.5
Cause of death		
Unsafe abortion	1	2.9
Haemorrhage	10	29.4
Infection	16	47.1
PIH	6	7.6
Obstructed labour	1	2.9
Contributing factors to death		
Patient factors	26	81.3
Medical factors	18	87.5
Transport/ access factors	15	46.9
Presence of more than one Contributing factors		
Three of the contributing factors	9	30
Interventions done before death		
Definitive treatment	11	32.4
Supportive treatment	23	67.6

5.2. Care seekers study

A total of 401 mothers were included in this quantitative part of the study with a response rate of 95%. Cases with postpartum hemorrhage, Preclampsia/eclampsia, obstructedlabour, sepsis (choriomamionitis), sepsis (puerperal), and labor were included in the interview. As shown in Table 5, the mean age was 25.6 with standard deviation of 6.5. Majority of the care seekers 295(79.1%) were unemployed, 84 (20.9 %) of them were unemployed. With regard to marital status, 358(89.3 %) of the mothers were married where as 43 (10 %) of them were not married.

The mean family income for those who were able to estimate was 579.2 Birr with standard deviation of 520.Birr.

With regard to parity 186(46.4 %) had no children, 181(45.1 %) had children between 1 and 4, and which is 34 (8.5 %) of the mothers had 5 or more children. Walking distance was also assessed in this study; the mean walking distance was 42 minutes ranging from 0 to 8 hours.

Majority of them 370 (92.3 %) traveled less than one hour to the hospital where the study was conducted, 31 (7.7 %) of them traveled above 1 hr. The educational status of the mothers revealed that 295(73.6 %) were literate and 106 (26.4 %) were illiterate.

Table 5, Socio demographic characteristics of the care seekers, May 2006, Tigray, Ethiopia

Characteristics	Frequency	Percent
Age in years		
Less than 18	58	14.5
19- 34	310	77.3
35 and Above	33	8.2
Mean (SD); Range	25.69 (6.5): 15-48	
Occupation		
Unemployed	295	79.1
Employee	84	20.9
Marital status		
Single	43	10.7
Married	358	89.3
Religion		
Christians	368	91.8
Muslim	33	8.2
Educational status		
Illiterate	106	26.4
Literate	295	73.6
Number of pregnancies		
0	186	46.4
1-4	181	45.1
5 and above	34	8.5
Mean (S.D) Range	1.4(1.9) 8.15	
Walking distance in hrs		
< 1	370	92.3
Above 1 hr	31	7.7
Mean (S.D), Range	0.3(0.8), 0- 8	

As shown in table 6 concerning care providers concerned 5(1.2 %) of the mothers were seen by traditional birth attendants (TBAs), 17 (8 %) of them seen by care providers at health post, 21 (5.2 %) by care providers at clinic. Of the 401 mothers included in this study 111 (27.7 %) of them were referral cases from different institutions ranging from health post to district hospitals. With regard to duration of stay at the referring institutions the mean was 3.7 hrs with standard deviation of 5.3. As shown in table 6 three hundred and fifty two (87.7 %) of the care seekers prefer to be attended by health professionals, 8 (2 %) and 40 (10%) of them preferred TBAs and family respectively.

As far as the reason for the referral cases is concerned 87 (21.8 %) goes to obstetric complications, 27 (6.7 %) goes to lack of skilled professional, and 76 (15) % goes to absence of the on duty staffs.

Majority of the mothers, 352 (87.8 %) believe that delay to seek care affects pregnancy outcome, where as 5 (1.2) % of the mothers do not believe that delay to seek care to affect pregnancy outcome, the other 42 (10.5 %) do not know whether it affects or not pregnancy outcome.

Table 6, Types of referring institutions and duration of stay at referring institutions, May 2006, Tigray, Ethiopia.

CHARACTERISTICS	*FREQUENCY*	*PERCENT*
Care providers consulted		
TBAs	5	1.2
Health post	32	8
Clinic	40	10
Health center	57	14.2
District hospital	21	5.2
Type of referring institutions		
Health post	5	1.2
Clinic	21	5.2
Health center	70	17.5
District hospital	14	3.5
Duration of stay at referring institutions In hrs		
0- 12	104	25.9
13- 24	2	0.5
25 and above	1	0.2
Mean (S.D) Range	3.7(5.3) 0- 36	
Preference of care providers		
Health professionals	352	87.7
TBAs	8	2
Family	40	10

The interval between the onset of signs and symptoms of obstetric emergencies and arrival at the facility is measured and operationalized as patient delay and the interval between arrival and initial evaluation is measured as hospital delay. As shown in table 7, the median (range) for the patient and hospital delays is eight (0-125) hrs and 0 (0-6) hrs respectively.

Table 7, patient and hospital delay, in care seekers Tigray Ethiopia may 2006.

	Patient delay in hrs			Hospital delay in hrs		
Name of the hospital	**Mean (S.D)**	**Median**	**Range**	**Mean (S.D)**	**Median**	**Range**
Mekelle	11(13)	6	0-125	0.36(0.8)	0.10	0-6
Adigrat	14(12)	12	0- 48	0.06(0.19)	0.01	0-1
Shire	18(17)	13	0-96	0.19(0.36)	0.01	0-4
Axum	10(7)	7	0-30	0.15(0.36)	0.01	0-2
Total	**12 (13)**	**8**	**0-125**	**0.24(0.67)**	**0.01**	**0-6**

Total delay refers to the sum of patient and hospital delay and as shown in table 8 the median (range) of total delay for meklle is 6 (127) and the median (range) of total delay for Adigrat, shire, Axum is 12 (48), 13 (96), 7 (30) respectively.

TABLE 8, Total delays in hrs, Tigray Ethiopia may 2006.

	TOTAL DELAY IN HRS		
NAME OF THE HOSPITAL	**MEAN (S.D)**	**MEDIAN**	**RANGE**
MEKELLE	11(13.1)	6	0-127
ADIGRAT	15(12)	12	0-48
SHIRE	18(17)	13	0- 96
AXUM	10(7)	7	0- 30
TOTAL	**13(13)**	**9**	**0-127**

The distribution of patient delay and hospital delay were tested for normality using Kolmogrove Simnorove and Q- Q PLOT and confirmed that the distribution were non normal as shown in Figure 1-2 as a result non parametric tests Mann Whitney U test was employed.

Figure 1 Normal Q-Q Plot of Patient Delay, Tigray Ethiopia May 2006.

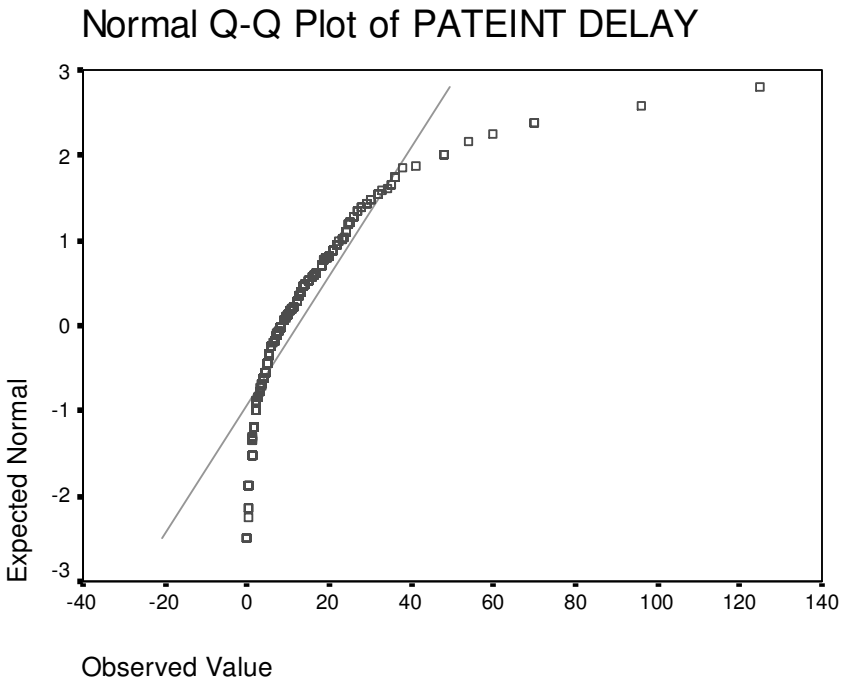

Figure 2 Normal Q-Q Plot of Hospital Delay, Tigray Ethiopia May 2006.

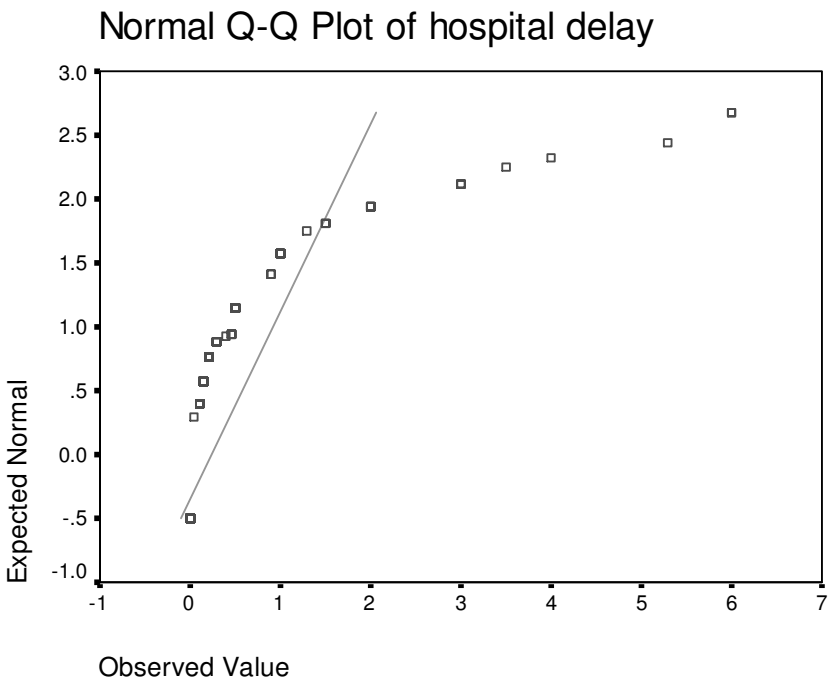

Table 9, Mann Whitney test of patient, hospital, and total delay between referral and zonal hospitals, tigray, Ethiopia may 2006

	PATEINT DELAY	HOSPITAL DELAY	TOTAL DELAY
Mann-Whitney U	15300	12501	15700
Asymp. Sig. (2-tailed)	.000	0.000	0.000
Mean (S.D)	10(13)	.24	13
Median	6	O	9
Range	125	6	127

A Grouping Variable: hospital stratification

Similarly Mann Whitney u test were employed on patient delay and certain scio demographic characteristics and none of them showed statistically significant difference except in mothers with children five and above and in mothers with children less than 5

As shown in table 10 the median patient delay of mothers with children five and above is significantly higher than the median patient delay of mothers with children less than five. There is statistically significant difference between median patient delay, hospital and total delay of zonal hospitals and referral hospitals

Table 10 Mann Whitney u test for patient delay by socidemographic charactestics, Tigray Ethiopia, may 2006.

	Characteristics	*N*	*Mean Rank*	*Sum of Ranks*	*Asymp.sig (2 tailed)*
Patient delay	Single	43	212	9136	0.49
	Married	358	200	71466	
	Illiterate	106	207	21956	0.52
	Literate	295	198	58645	
	Christian	368	202	74424	0.47
	Muslim	33	187	6177	
	Unemployed	317	200	63698	0.98
	Employed	84	201	16902	
	Complicated	47	178	8371	0.15
	Uncomplicated	354	204	72229	
	1-5 parity	181	102.96	18636.00	0.006
	Above 5	34	134.82	4584.00	
	Walking distance < 1 hour	95	52.29	4968.00	0.087
	Above 1 hour	10	59.70	597.00	

6. DISCUSSION

The mean (S.D) age at time of death were 25.68 (6.6) which showed us the relatively younger mother .36% of the mothers were prim mothers who are at high risk of developing obstetric complicaticions. Of the 34 maternal deaths, 8 (33.3%) of the deaths were hot having antenatal check ups, in this Death audit 79.3% of the deaths happened after the mother had delivered. For 6.9% of the deaths in this audit it was not known whether they died delivered or not, unskilled birth attendants did conduct Almost 21 % of deliveries. In these audits 55.2% of the deaths happened in those who delivered in hospital. In operationalizing this audit, the poor of quality of medical record were one of the difficulties.

It has been observed in almost all the facilities missed key data items were prominent findings. Out of the 18 key data items (appendix one) on average 5.74 key data items were missing. Time of admission, discharge and follow up of inpatients was a rare finding. Some of the entries in the patient medical records were also lacking signature of the attending care providers and not known who was attendant at that point. Lost patient medical records at all or missing part of the patient medical records were also common findings in this audit.

There were three maternal deaths in which no health care providers interviewed only chart review. The actual number of maternal deaths identified in the audit that happened in the year 2004/2005 is 29 where as what is reported by the H.M.I.S is only 14. For some deaths, it was found out that almost no information could be obtained and these deaths were omitted. There is only on and off morning sessions for physicians. Medical certification of maternal deaths is a rare finding, for hospital deaths they only put a cross sign boldly on the top and front page of the chart.

The following factors have been found to be common for the majority of deaths. A disproportionate number of deaths occur in the age group 18- 28. Higher number of deaths from rural areas. Insufficient blood transfusion was a common avoidable factor, Delays in seeking attendance occurred on a number of occasions.

Avoidability of maternal deaths as to the interviewed clinicians showed 15 (44.1 %) were unavoidable maternal deaths and 12 (35.7%) were avoidable maternal deaths.

The study on care seekers measured intervals both the patient and hospital delay. The mean patient delay was 12.2hrs .The hospital delay, after arrival varied by hospitals. the mean hospital delay is 0.24 hours (14 minutes) The longest length of time occurred in Mekelle hospital with an average of 0.36 hrs which is relatively higher than other hospital (Adigrat)

The mean age at time of death that showed us the relatively younger mothers who do not have adequate knowledge about danger of signs of pregnancy and complications of labor are dying. In addition, the level of their physical development might have also contributed to their untimely and tragedeic death. (20).36 % of the deceased women were primi Mothers who are at risk of obstetric complications (21)

33.3%of the deaths were hot having antenatal check ups, this points forwards a broader policy issues of making available the highest quality of antennal check up and its components. (22)

In these audits 55.2% of the deaths happened in those who delivered in hospital. This may show that poor quality of obstetric care as well hospital delivery may not be the safest options

for every mother, there are associated iatrogenic risks.(23)Maternal Deaths still occur, but instead of women dying in their 'hovels', they now die in hospitals (24)

In this maternal Death audit majority, 79.3% of the deaths happened after the mother had delivered, this is probably the post partum period is understood as risk free period. Despite the increased risk women are least likely to receive health care services during the postpartum period, thus highlighting what Abouzahar described of as a “mismatch" between periods of high-risk and patterns of provisions and utilization of maternal care (25)

Almost 21% of the deliveries in the death audit were conducted by unskilled birth attendants. This shows majority were attended by unskilled attendants which might have contributed to their death. (8)

In almost all the facilities missed key data items were prominent findings. Out of the 18 key data items (appendix one) on average 5.74 key data items were missing. Time of admission, discharge and follow up of inpatients was a rare finding. Some of the entries in the patient medical records were also lacking signature of the attending care providers and not known who was the attendant at that point.

Lost patient medical records at all or missing part of the patient medical records were also common findings in this Audit. Why signatures are missed? a question that needs to be answered. As far as accountability is concerned the absence of signature is a problem. Why times are missed? May be a sign of negligence.

A known and more common way to assess the third delay is through medical audit or record review (18) although there was an intention to measure the third delay using medical record review but it was not possible because of the poor quality of medical records.

The gap between the time of death and the interview ranges from days – few months. Why this happened? Is clearly related to the methodology of the maternal death audit utilized in this specific study. The audit was done retrospectively until the desired sample size is achieved.. The concern here is recall bias for some of the deaths happened months before the investigation .As maternal death is a rare event and the possibility of forgetting this painful event is minimal (6). In general it is preferable if death audit is done in the shortest possible time preferably on the day the event happened or in less than 02 weeks (26)

There were three maternal deaths in which no health care providers interviewed only the chart reviewed. This infact was a problem for getting more information from the care providers. This point out two things one is the need for doing death audit even though no care provider is available at that moment and the other implication is There is no point to exclude maternal deaths from death audit for the reason that no care provider available for that moment.

Even when patient medical records for the deceased woman are missed, every effort is needed to build a picture the deaths, using different available means, may be there were something behind these deaths (6)

The actual number of maternal deaths identified in the audit that happened in the year 2004/2005 is twenty-nine where as what is reported by the Health management information unit (H.M.I.S) is only fourteen. The reliability is questionable as far as the maternal death

audit findings are concerned. **Why such discrepancies do exists?** The problem can be interrelated starting from the sources of information that is the facilities where the deaths happened up to the recipients where such reports are compiled.

If you see who is compiling hospital statistics at facility and regional level some these people do have minimal knowledge about the importance of health information and maternal health, more over the hospital administrators. And the regional health bureaus have also shown lack of commitment to ward ensuring a strong and quality HMIS unit (27). Partly the discrepancy can be explained by the absence of medical certification of maternal deaths which is difficult for the data clerks who is responsible for compiling the reports (6)

The study on care seekers study measured intervals both the patient and hospital delay. Infact in developing countries, timeliness relating to safe motherhood was brought to the fore by the three – delay model, which specifies three types of delays that contribute to the likelihood of maternal death in the event of complication The first is delay in deciding to seek care, the second is delay in reaching treatment facility and the third is delay in receiving adequate treatment at the facility (28).

In this study, the first to delays (delay to seek care and delay to reach care) defined as patient delay. In measuring the length of patients delay we depended on patients reply. The patient delay constitutes from the onset of signs and symptoms of the condition until arrival at the facility. The median patient delay is much higher than median hospital delay, which identifies a possible area of interventions (29)

The median patient delay was 6 hrs, which may indicate patient can possibly survive with 6 hrs delay as there are 12 hrs or more to get life saving emergency obstetric care for most other complications except postpartum hemorrhage (30).In addition, the need the minimize the third delay is important.

The hospital delay, after arrival varied by hospitals. The highest median length of time occurred in Mekelle hospital with an average of 0.10 hrs, which is higher than other hospital (Adigrat), which was 0.The high hospital delay in Mekelle hospital is may be because of large number of client/ patient flow to Mekelle hospital than Adigrat hospital.

The low median hospital delay in the other three hospital which was 0 hrs may be due to high degree of alertness on side of the care providers, the relatively low patient flow than Mekelle, the presence of a triage system or may be the methodology used in this study which entirely depended on patent interview unlike other studies which depended on patient flow analysis.(20).

The median hospital delay is 0.24 hours (14 minutes), which is lower than the study demonstrated by (31) 0.5 hr (15 minutes). The longest length of time occurred in Mekelle hospital with a median of 0.10 hrs, which is relatively higher than other three hospitals. .

One hospital, Mekelle is responsible for the relative long hospital delay. It is believed that the long period of patient delay before arrival has a major contributor for the poor or undesirable outcome of conditions (32).The mean patient delay was 12.2hrs; this implies that there 12 hrs or more to get life saving emergency obstetric care for most other complications except postpartum hemorrhage (33). Moreover, the need to minimize the third delay is important.

The mean hospital delay is 0.24 hours (14 minutes) which is lower than the study demonstrated by (28) 0.5 hr (15 minutes). Why is it lower than the study demonstrated by quality assurance project, March 2006? The methods were different in the two studies. In this study to measure the length of hospital delay depended on the patient reply where as the quality assurance project, March 2006 utilized patient flow analysis. (31)

One of the objectives of this study was to assess avoidability of maternal deaths infact. A major problem in this study was to identify avoidable deaths and avoidable factors. it is very difficult to assess avoidability of deaths in an institution where there is no established maternal death audit system. The approaches used in this study to assess avoidability were interviewing the care providers w ho were involved in the care of the deceased woman “do you think any thing could have been to avoid her death."

If their response was yes, further the type of avoidable factors was asked.

There is no standard way of classifying avoidable factors (6). Finally avoidable factors were classified into three based on available literatures the first is Patient factors, the second is transport and access factors the third is Medical Service Factors(8). Avoidability of maternal deaths as to the interviewed clinicians showed 15 (44.1 %) were unavoidable maternal deaths and 12 (35.7%) were avoidable maternal deaths.

FACTORS RELATED TO TRANSPORTATION AND ACCESS.

In approximately 50% of the deaths transportation and access factors were identified Experience suggests that most of the patients come in private transport without any life care support. This holds true even when these patients have been taken to a district health facility or referral hospitals.

MISS N, was referred from health centre, she came in a private transport. There was no referral slip. It appears that she was not given primary resuscitation or IV fluids. By the time she arrived she was critical. She died within 02 days of admission. MISS K had a full-term pregnancy. She was brought in a private transport as case of ruptured uterus. By the time she arrived at the hospital she was already in a hypovolemic shock. She died on the way to the operation theatre. Some emergency management like resuscitation with IV fluids during transportation could have averted this outcome. She died with in 90 minutes of her arrival. When we compare it with study conducted a study in Nepal 1996 and 1997 and showed 8 % , this gives us a much higher percentage of transport and access avoidable factors.

MEDICAL SERVICE FACTORS.

In approximately 26 % the deaths, medical service related factors were identified. These include factors such as lack of blood, institutional delay in treatment, inappropriate treatment and misguided action by staffs.

Miss C was 28 when she died, second wife of a farmer, tell seller by occupation, who had No ANC Follow up, was completing her first pregnancy. Admitted on 10/05/2005 as a case of obstructed labour, after admission she was also augmented. On 11/05/ 2005.Labour pain

ceased. The Surgeon was consulted and caesarean section done. On 11/05/2006 right after Caesarean section she was put on antibiotics.

On 13/05/2005 day one postoperative, she started to have diarrhoea and fever for which it was decided to do explorative laparatomy on 26/05/2005 debridemnt of the infected dead tissue of the caesarean section wound done. On 6/06/2005 antibiotics discontinued then died on June 12, 2005 after she stayed for about 33 days. No follow up recorded from date June 10, 2006 until 12/06/2006. As to the view of the surgeon probably missing files, which is a major administrative problem in maternity services? Relatively she had long hospital stay, which probably speaks for poor quality of obstetric care.

Miss D, Who had twin pregnancy, delivered the 1st baby, who is stillbirth at home, the second baby was retained came after staying 02 hrs at home. On 27/01/2006 admitted to St. Marry hospital, at arrival her Blood pressure was 90/70 of mmgh, but had vaginal bleeding that time. One-hour later after she delivered the retained dead fetus and went into shock. Hence, uterine rupture was suspected and the abdomen was opened, there was No uterine rupture intraoperatively, abdomen closed.

The concern was again no urine output for this Again she was reopened, her abdomen was full of blood, no uterine rupture, finally intra operatively it was understood that she had bleeding from the wound, Stomach, from the catheter. The abdomen closed very soon in less than an hour she died on 27/01/2006.wrong diagnosis and wrong treatment were the avoidable factors in this case.

MISS Z, referral Case, she was unconscious on arrival at the referring institution. There appears to be misguided action in the sense that she was given chlorpromazine stat dose. This might have affected her outcome.

MISS B, admitted to labour ward by midwife nurse, initially well progressing well then her labour found out to be prolonged greater than 32 hrs and caesarean section done. Labour was not followed with partograph, which affected decision making to do obstetric intervention, there was Delay in decision-making.

When we compare this study, which identified approximately medical factors in 26 % of the deaths, much higher than the study done by sudah salan in India (8) which identified medical factors in 5% of the deaths. The identification of avoidable factors were based on interview from the care providers where as the study by sudah Salan (8) which identified medical factors in 5% of the deaths were based on decision of audit committee.

PATIENT AND FAMILY RELATED FACTORS

Patient and family related factors were identified in approximately 42 % of the deaths. These include factors such as late arrival including delay to seek care, home delivery while having bad obstetric history, congenital anomalies of the vagina, no antenatal follow up.

Miss E, she was 31 when she died, who had never been to school, referral case, which had bad obstetric history of three abortions previously. Admitted on 29/11/2004.At 09.25 Am as a case of Neglected Obstructed labour. On 29/11/2004 at 10.00am. After 25 minutes of her arrival, caesarean section done and Male dead neonate extracted. On 9/12/2004.she developed vomiting, distension and abdominal pain. The surgeon put a diagnosis of paralytic ileus and

peritonitis. On 9/12/2004, was reopened, after 03 days on 30/03/97 she developed overwhelming sepsis. At 08.30.00pm she died as a case of sepsis.

When we compare this finding with the study conducted in Nepal (6) patient and family related factors were found in 13 % of the deaths. Infact the findings of this study is higher, probably because of the high-level of maternal mortality in our country or because of the methodology in which audit committee decide on avoidable factors and the death audit was conducted with in 24 hrs of the occurrence of the event unlike this study that has included also deaths happened before one year.

When we see the median patient delay in the care seeker study it was 6 hrs which is supported with the findings of the maternal death audit.

6.1. STRENGTH AND LIMITATIONS OF THE STUDY.

6.1.1. STRENGTHS

- ✓ The care seekers study was supplemented with qualitative study
- ✓ The study was done across many facilities.
- ✓ The first of its kind.

6.1.2. LIMITATIONS

- ✓ The study conducted in facilities where there is no established death audit system
- ✓ The death audit was not supplemented with information from family and community members of cases
- ✓ The study on care seekers was not supported with observation of cases.

7. CONCLUSION

In conclusion, as far as maternal death is concerned, the situation is worst for relatively younger mothers and in some hospitals. Some of the deaths were avoidable. Delay in blood transfusion along with delay in definitive treatment was a common avoidable factor. In appropriate management and wrong interventions were rampant. Partograph were rarely used to follow labour. There were no treatment protocols for emergency obstetric care.

The qualities of medical records were very poor lacking many key data items and time element was a rare finding. Missing files were also a major problem along with lost patient medical records. No medical certification of causes of deaths.

Since no standards define "delays" it was found to be difficult to judge whether delays occurred or not and where the delays has occurred in the Care seekers component of this study. Parity was one of the factors affecting care-seeking behavior of mothers.

8. RECOMMENDATIONS

8.1. RECOMMENDATIONS INVOLVING HEALTH SECTOR.

- ✓ In order to avoid future maternal deaths death audit system at facility level should be instituted.
- ✓ Implementing an initiative to improve medical record to facilitate medical record review
- ✓ Develop and maintain as systemic triage and assessment of all incoming patients to reduce waiting times.
- ✓ Raising public awareness to utilize maternal health services
- ✓ In-service training for staffs.
- ✓ Comprehensive study on causes and magnitude of the third delay need to be done
- ✓ Standard should be developed to determine delays.

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33.Taylor and Francis, Journal of obstetrics and gynaecology volume 21 number 6, November 1 2001, pp 570-575U. Onwudiegwu, O. C. Ezechi **Annex one case study of each maternal death.**

Case of Miss A at Axum Hospital

Background and Time line of the events in January 2006

Miss A, 22, who had ANC follow up in near by health centre, she had minimal bleeding in her 3 rd trimester, the care provider in the ANC put her on iron tablet and advised her to deliver in hospital. In the mean time she developed severe vaginal bleeding. Brought her to a health centre 60 km a way from her residence in the health centre they kept her for 24 hrs before deciding to refer her to the next referral unit.

On 02/02/2006 at 1.45 P.M. admitted to st marry hospital Axum and she delivered dead foetus vaginally. After determination of Heamatocrit, in the immediate post partum period, the need for blood transfusion decided and at that time her Families were unfit to donate blood. As to the interviewed clinician there were delays in transfusing her at least for 24 hrs. On 03/02/2006 At 2.00 P.M.One unit of blood obtained but the mother died on 03/02/2006 at 5.00A.M with out being transfused.

Case of Miss B at Axum hospital

Background information Time line of the events in October 2005

MISS B was 21 when she died, had No ANC follow up in the recent pregnancy. NO History of abortion, No relevant past medical history and surgical problems. 0n 8/10/2005 in the afternoon at 3.00pm admitted to the hospital while in labour, with a diagnosis of active first stage of labour. After 02 days on 10/10/2005 at 2.20 pm, re-evaluated and malpresentation and prolonged labour diagnosed and caesarean section done on 10/10/2005 at 10.00pm.Day one postoperative period she was good for which she was transferred to maternity ward from the recovery room. On day 2 postoperative period she started to have chest pain, SOB, diagnosed as severe pneumonia and pulmonary edema for which Ampicillin and Gentamycin,

lasix ordered. the same day at 8.30 pm she died. As to the interviewed clinician Labour was not followed with partograph; as a result there was delay in decision making to do obstetric interventions.

Case of Miss C at Axum Hospital

Background information Time line of the events may 2005

Miss C was 28 when she died, second wife of a farmer, tell seller by occupation, who had No ANC Follow up, was completing her first pregnancy. Admitted on 10/05/2005 as a case of obstructed labour, after admission she was also augmented. On 11/05/ 2005.Labour pain ceased. The Surgeon was consulted and caesarean section done. On 11/05/2006 right after Caesarean section she was put on antibiotics.

On 13/05/2005 day one postoperative she started to have diarrhoea and fever for which it was decided to do explorative laparatomy.on 26/05/2005 debridemnt of the infected dead tissue of the caesarean section wound done. On 6/06/2005 antibiotics discontinued then died on June 12, 2005 after she stayed for about 33 days. No follow up recorded from date June 10, 2006 until 12/06/2006. As to the view of the surgeon probably missing files, which is a major problem in administrative problem in maternity services. Relatively she had long hospital stay which probably speak for poor quality of obstetric care.

Case of Miss D at Axum Hospital

Background information and Time line of events in January 2006

Miss D, Who had twin pregnancy, delivered the 1st baby, who is stillbirth at home, the second baby was retained came after staying 02 hrs at home. On 27/01/2006 admitted to st marry hospital, at arrival her Blood pressure was 90/70 of mmgh, but had vaginal bleeding that time. One-hour later after she delivered the retained dead fetus and went into shock. Hence uterine

rupture was suspected and the abdomen was opened, there was No uterine rupture intraoperatively, abdomen gets closed.

The concern was again no urine output for this Again reopened, her abdomen was full of blood, no uterine rupture, finally intra operatively it was understood that she had bleeding from the wound, Stomach, from the catheter. The abdomen closed very soon in less than an hour she died on 27/01/2006.wrong diagnosis and wrong treatment were the avoidable factors in this case.

Case Miss E at Adigrat hospital

Background information and Time line of the events in December 2004

Miss E, she was 31 when she died, who had never been to school, referral case, which had history of three abortions previously. Admitted on 29/11/2004 .At 09.25 Am as a case of Neglected Obstructed labour. On 29/11/2004 at 10.00am After 25 minutes of her arrival, caesarean section done and Male dead neonate extracted. On12.7.2004.she developed vomiting, distension and abdominal pain. On 9/12/2004 was reopened, the surgery time was relatively prolonged like 1hour ad 35 minutes. After 03 days on 9/12/2004 she developed overwhelming sepsis

One hour before her death her condition worsened and put on intranasal oxygen, suctioning done. At 07.20 pm order revised to keep her NPO and monitor vital signs. At 08.30.00pm she died as a case of sepsis. As to the view of the obstetrician there was Late arrival, one can argue that she would have been saved had caesarean hysterectomy been done.

Case of Miss F at Adigrat Hospital

Background information and Time line of the events in December 2005

Miss F, she was 30 yrs old when she died, had never been to school, referral, admitted to adigrat zonal hospital on 17/04/98, was poorly communicating on arrival, Had No ANC

follow up. Admitted to adigrat zonal hospital on 26/12/2005, was poorly communicating and jaundiced on arrival.

On 26/12/2005 at 6.30 pm she delivered a female preterm twin stillbirth neonate vaginally assisted by junior nurse, on 26/12/2005 at 2.10 pm her condition was critical and after receiving one unit of cross-matched blood she died of severe anaemia. Late arrival was there.

Case of Miss G at Adigrat Hospital

Background and Time line of the events in April 2004

Miss G, was 27 when she died, urban resident, Christian, her previous two deliveries were Caesarean Section As to the indication no document available. Has no hx of hypertension and post partum haemorrhage or diabetes mellitus. Admitted to adigrat hospital, on 7/04/2005 at 5.50 am with active phase of 1 st stage of labour. On 7/04/2005 at 6.20 pm, re-evaluated by obstetrician .On 7/04/2005 with caesarean section male neonate extracted. The surgery time was 30 minutes and anaesthesia time was also 30 minutes. On 12/04/2005 on the 5th post operative day she developed fever, chest pain, cough, was also in respiratory distress, for which she was diagnosed to have pneumonia and genital infection. But blood was a problem to reoperate her immediately. By the time blood was available her pre aesthetic assessment revealed that she was unfit to take general anaesthesia. On 13/04/2005 died with out being reoperated. Avoidable factors she tried to labour at home while having two previous caesarean section.

Case of Miss H at Adigrat hospital

Background and time line of the events January 2005

She was 18 when she died, primiparous who gave birth at home to an alive female neonate. She had history epilepsy on irregular follow up. 03 days after she gave birth, on 22/09/2005 at

11.00am arrived at adigart hospital .She had fever, chills, and abnormal body movement. Her Blood pressure was 160/120 mm of hg.

Atypical ecalmpsia and severe and complicated malaria were top in the differential diagnosis. Her haematology result confirmed negative for heamoparasite. She had been managed as a case of atypical eclampsia. She died of eclampsia and multiple organ failure on 20/01/2005 at 11.20. She had delay at arrival, which affected her condition,

Case of Miss I at adigrat hospital

Background and time line of the events September 2005

She was 29 when she died, urban resident. Who had a single visit to medical OPD for a complaint of jaundice in pregnancy in this hospital. On 22/09/2005 with deep jaundice after expelling of dead foetus 12 hrs back admitted to Adigrat hospital, at that time she was also non-communicating. On admission the diagnosis were severe and complicated malaria, and retained products. In patient evaluation revealed that her condition worsens with deepening coma and jaundice. The diagnosis shifted to multi organ failure with possible post partial eclampsia. Quinine discontinued. Continued with oxygen intermittently and coma care. On 13/09/2005 she died of multiorgan failure. As to the view of the general practitioner. Avoidable factors were home delivery and lack of ANC follow up.

CASE OF MISS J AT ADIGRAT HOSPITAL

Background information and Time line of the event April 2005

She was 26 when she died, who had No ANC follow up. On 13/04/2005 at 5.50 pm admitted to adigrat hospital Non communicating, with abnormal body movement. For Which diazepam, hydrazine and crystalline penicillin. As well coma care given. The plan of care was stabilization. She delivered an alive baby. She came to hospital the day referred. Close to time

of death before 30 minutes, she had bleeding from any site, was jaundiced, extremely short of breath.

She died at 14/04/2005 at 3.00pm. Stated cause of death is multiorgan failure. Avoidable factors included the absence of ICU.

CASE OF MISS K AT MIDRE GENET HOSPITAL

Background and time line of the events June 2005

A rural resident, Christian, Was when she Died. Admitted on 9/06/2005 at 6:30 Am as a case of ruptured uterus. She was in shock on admission. The plan of care was of the admitting physician was resuscitation, preparing for caesarean section. Double IV line secured, Haemoglobin was 6 gm % and had signed a consent form. Before her death. She had vaginal bleeding, Shortness of breath. She had consent form. Died on 9/06/2005 at 8.00Am.she died after 90 minutes of stay in the hospital. She died with out having major surgery, which is an avoidable factors.

CASE OF MISS L AT MIDRE GENET HOSPITAL

Background information and Time line of the events in August 2005

A primigrada lady rural resident, on 16/07/2005. At 1.15 pm admitted with cessation of labour of one day duration. Ruptured uterus was the initial diagnosis. Gave birth to dead fetus received different forms treatment. On admission she was febrile and her Blood pressure of 130/80 mmofgh. The same day was suspected of post-partal ecalmpsia and anaemia for which laparatomy done and rupture repaired.

Close time of death she had prolonged labour, was jaundiced, severe abdominal pain, chest pain, shortness of breath. Died 5 hrs after the operation on 16/07/2005. As to the view of the clinician she had hymenorraphy with partial success, which might have contributed, to her death, the referring institute has also delayed to refer her to the hospital where she died.

CASE OF MISS M AT MIDRE GENET HOSPITAL

Background information and Time line of the events in August 2005

She was 18 years old when she died, a rural resident referral, Had ANC follow up. On 16/10/2005 at 10.00am admitted AS A case of coma and atypical ecalmpsia. Inthe immediate post partial day she had abnormal body movement including all extremities her B/P was 70/60-mmof hg. She was resuscitated with IV fluids, diazepam. She was covered for malaria with chloroquine intravenous. On 18/10/2005 found to be critical and 30 Minutes before her death she had convulsion. She died on 18/10/2005 at 12.00 mid day. Avoidable factors non-existent.

CASE OF MISS N AT MIDRE GENET HOSPITAL

Background information and Time line of the events December

Miss N Was 34 when she died, from, No bad obstetric history She was generally well. No similar problem in previous pregnancy, no history of trauma. Admitted on 28/12/2004 at 1.30 pm for vaginal bleeding, abdominal tenderness but communicating, no similar problem in previous pregnancy, no history of trauma. Caesarean section done, Dead fetus extracted. This mother was diagnosed as having abruption placenta intraoperatively. Post operatively she was put on IV fluids, IV antibiotics, and intensive care.

Despite this her condition worsened, 4hrs before her death she had convulsions/fits, were extremely short of breath, vaginal bleeding, abdominal pain. Died on 29/12/ 2005 at 6.00. There was delay before arrival at facility and lack of blood as an avoidable factor.

CASE OF MISS O AT MIDRE GENET HOSPITAL,

Background and Time line of the events July 2005

MISS O was 37, when she died, and who was completing her fifth pregnancy admitted with cessation of labour. Admitted on 12/07/2005, as case of uterine rupture. Right after admission started on IV antibiotics. On 12/07/2005 at 12.30 Am her blood pressure was unrecordable. Until then two units of cross-matched blood transfused, resuscitated with IV fluids. After 02 hrs of resuscitation, abdomen opened, the mother died as soon as the baby comes out. Died on 12/07/2005 At 12.00 mid day in the operating room. Avoidable factors non-existent.

CASE OF MISS P AT MEKLLE HOSPITAL

Background and Time line of the events November 2005

Miss P Was 20 when she died, she gave birth to alive neonate on her way to Meklle hospital. She had no active bleeding, admitted with suspicion of hypoglycaemia on 16/11/2005 by a general practitioner and was resuscitated with IV fluids and 40 percent glucose IV, Was febrile and restless, slightly icteric on admission Blood film was done soon. She found to be positive for plasmodium falciparium. Immediately medical consultation done and a senior came and put a diagnosis of cerebral malaria. She has been managed with quinine.

Despite the management her condition worsened and died on 17/11/2005 at 3.00pm. As to the view of the clinician she could have been saved with availability of blood drugs and drugs like phenobarbitone.

CASE OF MISS Q AT MEKELLE HOSPITAL

Background and Time line of the events April 2005

Miss Q was 30 when she died, urban resident, referral case, Whose ANC follow up status is unknown. She gave birth at home 05 days before her admission. She had two previous caesarean section. Admitted as case of puerperal sepsis, on admission she was critical and in sepsis. Fever, abdominal pain and offensive vaginal discharge were there. Immediately she was put on antibiotics and side-by-side investigation ordered. Was on antibiotics and other care for 05 days.

On 30/4/2005 her condition was not recorded but treated with adrenaline nasal pack and Gentamycin. On May 1, 2005 was experiencing shortness of breath and high-grade fever for which blood film was done along with haemoglobin as well put on intranasal oxygen. On May 2, 2005 she died.

CASE OF MISS R AT MEKLLE HOSPITAL

Background and time line of the events August

Miss R was 35 when she died, rural resident, admitted on August 12, 2005 at 12.00pm, as a case of severe anaemia. On admission to the hospital she was pale, in distress, her haemoglobin was less than 2 gm % and she was put on IV quinine, vitamin B complex and antipyretic. Her blood film was positive for plasmodium falciparum. She was supposed to be transfused but there were no compatible blood. She was generally well before she came pregnant. On August 13, 2005 her condition worsened died. As to the view of the clinician blood would have definitely saved her.

CASE OF MISS S AT MEKLLE HOSPITAL

Background and time line of the events April 2005

Miss S, 25 when she died, urban resident, she was brought to Meklle hospital while in shock on April 30, 2005 as after delivered at home alive neonate. She was restless, in shock. Her blood pressure was unrecordable on arrival. She had no active bleeding. Initially was resuscitated with IV fluids. The plan of care was resuscitation with blood and work up of the patient, suturing the episiotomy, monitoring input and output, despite resuscitation with IV fluids .She died on April 30, 2005.dely in transfusing her was one of the avoidable factors.

CASE OF MISS T AT MEKLLE HOSPITAL

Background and time line of the events July 2005

Miss T, 28,was completing 12 weeks of gestational age when she died. Arrived at Meklle hospital on July 22, 2005 at 6.00 pm as case of anaemia and sepsis secondary to abortion. On admission she was febrile, non communicating, her blood pressure was 90/ 40 mm of hg.her haemoglobin was 2.5 gram percent. Immediately IV line secured, antibiotics started. Blood film was also done.

A gynaecologist was consulted and ordered to transfuse her. The plan of care was transfusion, antibiotics and evacuation. She died on July 22, 2005 at 3.00-pm.close time of death she had bleeding from the vagina, extremely short of breath. Delay in receiving appropriate care at the facility.

CASE OF MISS U AT MEKLLE HOSPITAL

Background and time line of the events December 2005

MISS U, 18, who has been amenorrhoea for about 06 months, brought on people back, non-communicating to Meklle hospital on December 6, 2005 at 8.00 pm. She was unconscious

when they brought her. Before she loses her consciousness she had abdominal cramp, polydipsia, vomiting. Diagnosis at admission was DKA and Eclampsia. The plan of care was immediate admission, investigation, and consultation. Immediately acted. Resuscitated with IV fluids, diazepams were given to control seizure. 5 hrs before her death she had convulsions, severe abdominal pain, bleeding from the vagina, febrile, jaundiced and extremely short of breath.

Lastly died on December 6, 2005 at 10.00pm. As to the view of the clinician avoidable factors included she did not receive the appropriate antibiotics and investigations were incomplete.

CASE OF MISS V AT MEKLLE HOSPITAL

Background and time line of the events April 2005

MISS V, She was 18 when she died. On April 11, 2005 and admitted as a case of coma secondary to eclampsia.the physician who saw her first was confident of the diagnosis of eclampsia. Investigation done, routine care of eclampsia rendered. Was induced and induction failed then caesarean section done. Dead baby extracted. From April 11, 2005 until April 22, 2005 she was comatose. Was on routine coma care. On April 13, 2005 developed and generalized edema as well paraplegia for which she was given ceftriaxone.

On April 23, 2005 internist consulted but before evaluation of the internist she died on April 23, 2005 at 11.55am.close to time of death she had high fever. Avoidable factors include delay before arrival at the facility.

CASE OF MISS W AT MEKLLE HOSPITAL.

Background and time line of the events

MISS W aged 30 when she died, from afar regional state, which gave birth at home after prolonged labour. Admitted on October 8, 2005 at 1.55 A.M. She was a case of retained placenta and hypovolmeic shock. She had continuous vaginal bleeding. The plan of care was

resuscitation with IV fluids and investigations. On arrival her blood pressure was unrecordable for which she was given IV fluids. On October 8, 2005 at 12.40 A.M still her B/P was unrecordable for which she was started on pitocin.

On October 9, 2005 she continued to bleed for which two units of blood prepared. And transfusion started soon the patient expired before even taking half of the one unit cross-matched blood. Close to time of death she had bleeding from the vagina, extremely short of breath. As to the view of the clinician there was delay in transfusing her with blood, thee was also delay in consulting gynaecologist for definitive treatment.

CASE OF MISS X AT MEKELLE HOSPITAL

Background and time line of the events may 2005.

MISS X, afar-regional state, She came after labouring at home. Admitted in the weekends to Meklle hospital on May 28, 2005 at 7.00 am as a case of septic shock secondary chorioaminiotis. Instantly acted Dead fetus extracted. Her blood pressure was unrecordable on arrival, and then she was put on antibiotics and IV fluids. While resuscitating ultrasounography examination done and suggested endometritis. She has also taken one unit of cross-matched blood. As time goes on, her condition worsened with high fever and extremely short of breath .She died on May 30, 2005 after staying in septic shock for 03 days. There was delay before arrival at the facility.

CASE OF MISS Y AT LEMELM KARL HOSPITAL

Background and time line of the events in April 2005

Miss U She was 23 when she died; she came when her gestational age was 32 weeks. Admitted on April 21, 2005 as a case of severe and complicated malaria, her B/P was 90/60 mm of hg, was comatose. Resuscitated, Investigations shows positive for plasmodium

falciparum antimalarials were given on April 23, 2005 at 9.10 AM with out describing her condition additional order given to start crystalline penicillin, chloramphenicol.

Again on April 23, 2005 at 8.00 pm she was still comatose, convulsing, and febrile and after giving birth to dead fetus diagnosed to have aspiration pneumonia. She was in coma associated with repeated attacks of seizure. She deteriorated despite the therapeutic and supportive treatment she died on April 24, 2005 at 5.30 AM. Avoidable factor non-existent.

CASE OF MISS Z AT LEMELM KARL HOSPITAL

Background and time line of the events in April 2005

MISS Z, 21 when she died, she was in her second trimester, who was generally well before she came pregnant, admitted to lemlem Karl hospital on December 6, 2005, her blood pressure was raised with 160/100 mmof hg.

She was managed as a case of eclampsia with anti hypertensive drugs, oxygen and sedatives, was sedated as well on antihypertensive drugs other supportive measures. Investigations for heamoparasite showed negative for heamoparasite. On December 6, 2005 was put on pitocin but not well progressing again on December 7, 2005 again continued with pitocin side by side antibiotics started.

Close to time of death she had generalized edema, convulsions, bleeding from the vagina, extremely short of breath. Her condition deteriorated and she died on 7/12/ 2005 at 7.00 pm. At the referring health center chlorpromazine injection were given.

CASE OF MISS 11 AT LEMELM KARL HOSPITAL

Background and time line of the events in

MISS 11, she was 45 when she died, primpara, who gave birth at home admitted, as a case of shock secondary to post partum haemorrhage. On admission she had vaginal bleeding and

loss of consciousness. This mother first delivered at home then she went to the health centre for the retained placenta.

At the health centre resuscitated with normal saline but referred with out definitive treatment like manual removal of the placenta. Close to the time of death she had bleeding from the vagina, high fever, extremely short of breath. At the referring health center manual removal of placenta would have saved her.

CASE OF MISS 22 AT LEMLEM KARL HOSPITAL

Background and time line of the events in December 2004

Miss 22, she was 17 when she died, who had labour pain of 2 days duration. Obstructed labour with Intrauterine fetal death is diagnosed in this mother. Admitted on December 15, 2004.The IV line secured and catheterized.

On15/12/2004 at 11.45 A.M. IV line secured, Craniotomy done on December 15/12/2004 at 6.00 M.D by a general practitioner. The same day at 2.00 pm, her condition worsened with vaginal bleeding and unrecordable blood pressure and evaluated and uterus explored no conceptus tissue found. Post partum haemorrhage secondary to uterine atony, possible septic shock diagnosed.

Additional order given, to prepare 03 units of blood, to start her with pitocin, to prepare her for hysterectomy. On 16/12/2004, she was transfused with one unit of blood. She died on December 16, 2004 at 3.00 pm. Close to time of death she had extremely short of breath, bleeding from the vagina.lack of blood and delay at arrival were avoidable factors identified in this case.

CASE OFMISS 33 AT LEMLEM KARL HOSPITAL

Background and time line of the events in December 2004

She was 18 when shed died, who gave birth at home one month back, came with abdominal pain, fever, diarrhoea. Admitted on 7/01/2005. Her blood pressure was on 80/60 mm hg.

Puerperal sepsis and pnueomea with acute gastroenteritis. Were the diagnoses the, resuscitation with Iv fluids and an Iv antibiotic was given. Order was also given to transfuse her with one unit of blood. On7/01/2005 at 9.11pm a surgeon evaluated the patient and put a diagnosis of acute abdomen secondary to endometritis.

As a result on 8/01/2005 laparatomy done after taking one unit of cross-matched blood. On 24/01/ 2005 as her condition worsened. Re laparatomy was planned but the patient was unfit to take anaesthesia. With out being reoperated on January 26, 20005. She died at 09.45 am. Close to time of death she had high fever and extremely short of breath. Lack of blood, delay at arrival were the avoidable factors identified.

CASE OF MISS 44 AT LEMELEM KARL HOSPITAL

Background and time line of the events in December 2004

MISS 44, she was 20 when she died, admitted as a case of puerperal sepsis on June 1, 2005, came to this hospital after she delivered at home. Resuscitated with IV fluids and transfused with one unit of blood. Her general health before she became pregnant was unknown, the day she was admitted died, and on June 1, 2004. Close to time of death she had high fever, extremely short of breath.

CASE OF MISS 55 AT LEMLEMKARL HOSPITAL

Background and time line of the events November 2005.

MISS 55, she was 25 when she died, was completing her fourth pregnancy term pregnancy tired to labour at home but no progress for which she sought care. Admitted on November 30, 2005 at lemlem Karl hospital .On admission her blood pressure was also unrecordable, was critical. Intrauterine fetal death and uterine rupture suspected. IV line opened, IV antibiotics started, Prepared for caesarean section.

While the plan of the consulted senior was to do total abdominal hysterectomy but patient found to be unfit to take anaesthesia .on November 30, 2005 at 2.30 pm again the order gets revised with lasix intravenously, hydrocortisone, oxygen intranasal. She took 03 bags of crystalloids and 02 units of blood despite which her blood pressure was unrecordable. Septic shock with renal failure was diagnosed. Operation can to be done as a result she died on November 10, 2004 at 04.00 pm.

Close to time of death she had long labour longer than 12 hrs, high fever, severe abdominal pain, extremely short of breath. She was referred with out any obstetric first aid measures to this hospital. Service inadequacy at the referring hospital to do caesarean section was identified as avoidable factor.

CASE OF MISS 66 AT LEMLEMKARL HOSPITAL

Background and time line of the events.

MISS 66, she was 25 when she died from amahara regional state, she gave birth at home 02 weeks ago before her arrival at this hospital, it was prolonged labour, 05 days after she delivered at home she lost her consciousness was taken to sekota hospital in a hospital in amahra regional state, part of the placenta removed at sekota hospital, antibiotics given. She lost her consciousness on10/11/ 2004 for the part of the placenta remained and for the lost consciousness referred to lemlem Karl hospital.

On 11/11/2004 she started to have generalized tonic clinic seizure and decision given to prepare her for hysterectomy. Still was not operated on November 12, 2004 On13/11/2004 up to 15/11/ 2005 was on supportive care. She died before operation on 15/11/2004. There was delay in receiving care for 02 days.

CASE OF MISS 77 AT LEMLEM KARL HOSPITAL

Background and time line of the events may 2005

MISS 77, she was 35 when she died, was completing her sixth pregnancy. She has been attending ANC. Admitted on 30/05/2005 as a case of hypotension and hypoglycaemia. Her blood pressure was unrecordable on admission. Her blood investigation shows positive for plasmodium falciparum for which she was put on quinine intravenously. On May 31, 2005 when her condition worsened, her order revised and covered with Antibiotics. She died on 31/05/2005. She died undelivered when she was on 08 months of pregnancy. Avoidable factors were non-existent.

CASE OF MISS 88 AT LEMLEM KARL HOSPITAL.

Background and time line of the events in Nov 2005

MISS 88, She was 21 when she died, referral from amahara regional state. Admitted as case of puerperal sepsis to lemlem Karl hospital on 11/11/2005. She gave stillbirth at home. On admission her Blood pressure was unrecordable. The plan of care of the admitting physician was immediate admission, resuscitation, covering with antibiotics. She died on 12/11/2005. Ways that lead to her death includes home delivery, distance from her residence to lemlem Karl hospital, and misguided action at the referring hospital.

ADDIS ABABA UNIVERSITY DEPARTMENT OF COMMUNITY HEALTH

Annex. 2. Instrument For the maternal death Audit (record review)

001. Study area: zone _____Region_____Name of the health facility _____

FORM A SUMMARY SHEET

ESSENTIAL DATA ITEMS	**DETAILS**	**DATA SOURCE USED (tick none, 1 or more as appropriate (√)**			
		Written		**verbal**	
		Facility records	women-held record	Staff	relatives/ attendants/ friends
woman's name					
Name of next-of-kin / contact person					
address / location of next-of-kin					
Rural/urban residence of woman					
Death					
Date of death					
Time of death					
Date of admission					
Time of admission					
referral, (if yes, type of facility referring)					
cause of death					
Type of facility					
Age					
Parity					
gestation at time of death					
Any treatment received					
Died delivered/undelivered					
Place of delivery					
Main attendant at delivery					
Baby born alive					
Avoidable factors					

CONFIDENTIAL

FORM B Codes assigned to staff involved

Case of.... *Miss* **..... at .....** *Hospital***.....**

Name and job title	Signature count	Confidential code assigned

Name of data collector:

Date of completion:

Form C

Medical record extraction form

Key data item	**Details**	
Name		
Name of next-of-kin		
Age		
Address		
Relevant past medical history		
Past obstetric history		
Gravidity		
Parity		
Antenatal care attended	Yes/no	No. of visits:
Gestation at time of death		
Died delivered or undelivered		
Place of delivery		
Main attendant at delivery		
Referral (if yes, type and name of facility referring)		

Form C (continued)

Date / time	**Description condition of patient**	**Action taken**	**Staff code**

Outcome	
Date of death	
Time of death	
Autopsy finding	
Final diagnosis	

Quality of medical record		
Number of key data items missing	Number:	
Legibility	Poor:	Good:
Number of entries	Number:	
Number of entries with signature	Number:	

Name of data collector :

Date of completion :

Form D

Facility Staff Interview Record

Introduce yourself and thank the respondent/s for helping the investigator by agreeing to be interviewed. Use the codes assigned on Form B to note the person giving response. If there are staff present who would not have

written in the notes (e.g. orderlies) but who cared for the woman, give them a code too, and add it later to Form B.

Name of woman .....

Checklist	**Details**
Verbatim report 'Can you tell me what happened from the time (name) arrived at (name of facility) until she died?' **Respondents knowledge** 'Were you with (name) when she died?' If no, how long before her death did you see her?' 'Who told you about her death?' 'Was this person with (name) when she died?' 'About how long after her death, did you hear about it?'	
Checklist	**Details**
Treatment at the facility 'Who (level of staff) admitted (name)?' or 'who was looking after (name) when her death occurred?' 'What did you make of her condition when you	

first commenced her care?' 'Did you feel confident in your diagnosis?' s'What was your plan of care, (including referral to medical staff)?' 'Were there any obstacles to/delays in implementing your plan?' 'What were these?' ` 'Were you able to stay with (name) at this time or not?' If not, 'Why not, and did anyone (incl. relative)?' **Action taken** 'About how long after you felt something was seriously wrong did you decide to act?' 'What did you do (including referral to medical staff/facility if asking at satellite clinic)?' 'Did you feel confident in carrying out these actions, did you have enough support?' 'Did you have the appropriate equipment/drugs? If not, do you know why not?'	
Checklist	**Details**
Symptoms before death 'Close to the time of death, did (name) have any of the following problems: - convulsions/fits - bleeding from the vagina (flooding with blood) - long labour (longer than 12 hours) - high fever - yellow skin or eye	

- severe abdominal pain - severe chest pain - extremely short of breath - coughing up blood **Relevant factors before arrival at facility** 'Were there any factors before arrival at the facility which affected the woman's condition?' - treatment from TBA/traditional healer - mode of transport **Antenatal care** 'Did (name) ever go for antenatal care during her last pregnancy?' 'Did she go more than once?'	

Checklist	**Details**
'Were these visits because she had a problem or just to check on the pregnancy?' **General health** 'Before (name) became pregnant for the last time, was she generally well?' 'Did she have any long-standing medical problems?'	

Avoidable factors 'Do you think anything could have been done to avoid her death?' - availability of equipment (e.g. vacuum aspirator) - availability of supplies (e.g. blood, drugs) - delays in receiving appropriate care at facility - delays before arrival at facility (eg. no transport) - contributing circumstances and events in the community (eg. untrained TBA attended delivery) - woman's characteristics (eg. previous obstetric history)	

Summary of avoidable factors	**Importance of factor (√)**		**Type of factor (√)**					
	Definitely would have avoided death	Possibly would have avoided death	Staff oversight	Staff misguided action	Staff incompetence	Service inadequacy	Events and circum-stances in the community	Woman factors
1								
2								
3								
4								

5								

Name of data collector:

Date of completion:

Form E

Woman-Held Record Extraction Form

Data item	
Antenatal care	Yes / no
Number of visits	
Tetanus toxoid received	Yes / no
Iron supplementation given	Yes / no
Recommended place of confinement	
Relevant past medical history	
Past obstetric history	
Complications (e.g. raised blood pressure, proteinuria, antepartum haemorrhage, malpresentation)	

Marital status	
Education	
Length of time since last delivery	

Name of data collector:

Date of completion:

ADDIS ABABA UNIVERSITY DEPARTMENT OF COMMUNITY HEALTH

Annex.III

Annex.3.1- English version For Quantitative part of the study

Questionnaire on assessment Care seeking time in obstetric emergency

001. Study area: zone _____

Region_____

Name of the health facility _____

002. Are you willing to participate in this study?

1. Yes
2. No

003. Signature of the interviewer, which certifies that, informed verbal consent is obtained.

Name_____

Signature_____

PART-ONE SOCIO- DEMOGRAPHIC AND EONOMIC ASSESSMENT.

NO	Questions	Responses		Skip
101	What is your age	_____ years		

102	Marital status	1. single 2.married 3.divored 4. Widowed.		
103	Educational status	1. illiterate_____ 2..only read and write____ 3.primary_____ 4.secondary_____ 5.Teritiary_____		
104	Monthly family income	_____Eth.Birr.		
105	What is your religion?	1. Orthodox 2. Protestant 3. Catholic 4.Muslims 4. Others, specify		
106	What is your occupation?	1. House wife 2. Government employee 2. self employee 3. Student 4.others specify_____		
107	Parity	No of deliveries _____		

PART- TWO WOMEN CHARACTERISTICS.

201	Maternal complication in previous pregnancy	1. yes 2.No		

202	Maternal complication during this pregnancy	1. yes 2.No		
203	What time the signs and symptoms of labour or the complaint began?	Date_____ Time _____am/pm		
204	When was the decision to seek care made?	Date_____ Time _____am/pm		
205	Who was consulted?	1. TBA Date_____ Time_____ 2.H/post Date_____ Time_____ 3.clinic Date_____ Time_____ 4.H/center Date_____ Time_____ 5. Other hospital. Date_____ Time_____ 6.This hospital. Date_____ Time_____		
206	When did you get first evaluated at this Hospital?	Date……. Time……am/pm		

207	Means of transportation from home to the nearest institution	1. motorized transport 2. on peoples Back 3. Animal 4.Walking 5.others(specify)		
208	Means of transportation from the nearest institution to this hospital	1. motorized transport 2. on peoples Back 3. Animal 4.Walking 5.others(specify)		
209	Is there a transportation problem on the way to health facilities?	1.Yes 2. No.		
210	If the response to qes no 209 is yes	1.Inaccessible to car 2.Only dry weather road 3. Expensive. 4. Others (specify).		
211	How far is the nearest health facilities from your residence?	_____hrs.		
212	Are you a referral case from elsewhere?	1.yes 2.No ----------		216
213	Time of referral	Date_____ Time_____am/pm		

214	Duration of stay at referring health institution?	_____hrs.		

215	What is the Type of referring unit?	1H/post 2..clinic 3.health center 4.hospital		
216	What is the Reason for referral?	1. lack of trained staff 2 lack of medicine/equipment 3. absent staff. 4.obstetric complications 5. others. 99. donot know		
217	Do you prefer hospital delivery?	1. yes 2. no		
218	If the answer to Q.216 Is no What is you reason?	1. Fear of discrimination 2.Distance 3. Financial problem. 4. Physical abuse by the care providers. 5.others		
219	Do you think delays to seek care to be a factor in pregnancy outcome	1. Yes 2. No 3. Donot know		

220	Whom you rely very much for delivery or other obstetric care	1.Family/neighbours 2.TTBA 3. Health Professional 4.others specify		
221	If the answer to the above question is TTBAs ,family/ neighbours what is your reason?	1. TBA s/ family neighbours are cheaper. 2. Lack of trust in the service offered at the health units. 3. No near by health facilities. 4. other(specify)		

Annex IV conceptual framework for the reduction of delays in obstetrics

CONCEPTUAL FRAME WORK FOR THE REDUCTION OF DELAYS IN OBSTETRICS