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CAUSE, MAGNITUDE AND CONTRIBUTING FACTORS FOR MATERNAL DEATH IN SELECTED HOSPITALS IN SNNPR BETWEEN 2007/2008 AND 2009/2010

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ABSTRACT

Introduction: Maternal mortality has high public health importance because of its magnitude in Ethiopia. Its reduction is possible. However, factors contributed to maternal mortality not sufficiently identified in Ethiopia. Objective: To identifying cause, magnitude and contributing factors for maternal death in selected hospitals in SNNPR between 2007/2008 and 2009/20010. Method: A retrospective register based study was conducted in SNNPR in purposively selected three hospitals. All maternal deaths recorded during the study period were included. Data were collected by reviewing records using pre-tested checklist. Data collectors were Midwives from health center. Training was given for data collectors and supervisor. Data was entered and cleaned using EPI version 3.5.2. The cleaned data was exported to SPSS version 16, for descriptive statistical analysis. Result: Maternal deaths were 127 & maternal mortality ratio was 1360/100,000 live births. Direct obstetric causes of death accounted for 88%, out of which 31%, 23 % and 15% were obstructed labour, hemorrhage and eclampsia cases, respectively. Low (3.1%) of ANC follows up. Seventy percent of mothers were in labour for 2-3 days at home and 48.4% mothers died on the day of admission. Patients who were potentially in need of blood transfusion, 90%, 84% and 79% of APH, PPH and ruptured uterus cases respectively, died without receiving it. Conclusion: Maternal mortality ratio was high. Obstructed labour was the leading cause of death. Delay in health seeking behavior as patient factor and delay at health facility as provider factor have contributed to maternal death. Based on this finding regional health office was suggested to make the comprehensive emergency obstetric care service accessible to the rural society in which the majority lives and birth preparedness emergency readiness should be enhanced in the community.

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Keywords: Maternal death, Magnitude, Cause, Contributing factors

Contribution/ Originality

While the overall maternal death in Ethiopia is decreasing, there is still increased number of maternal death in selected regions in SNNP. Though it relies on review of registrations only, the study could reflect significant difference among regions in the country

1. INTRODUCTION

Pregnancy & child bearing is experienced not as the joyful event as it should be, rather end in death [1]. Worldwide, annually 536 000 maternal deaths occur, of this 99% accounted for developing country and more than half occurred in the sub-Saharan Africa [2]. Ethiopia is one of the countries with high maternal mortality ratio (676/100,000 live births) [3] and the 4th in the world in maternal death [4]. As it is indicated in the above MM ratio is highest and skilled attendance at birth is one of the lowest in the world 6% [3], Thus, reduction in maternal mortality ratio by three quarter as speculated in the MDG target is a challenge for Ethiopia to attain.

The fifth MDG addresses the need to improve maternal health and sets a target of achieving 75% reduction in the maternal mortality ratio. For this target, two indicators have been selected to help track progress: maternal mortality ratio and proportion of births attended by skilled health personnel [5].

Experiences from developed countries with lower mortality rate showed that proper family planning, ANC, skilled delivery, PNC, accessibility and availability of health facilities, which can provide comprehensive obstetric service with properly trained health professionals, have significant role in reducing maternal mortality. Considering these, there has been substantial investments by the government of Ethiopia on provision of comprehensive B/CEmONC services. Accelerated training of health officers has been initiated and around 5,000 were enrolled, of which about 70% were graduated and deployed. Masters level program in Emergency Surgery and Obstetrics for health officers has been introduced and the first batch has already graduated and deployed. Key pilot initiatives such as Making Pregnancy Safer have been also been evaluated. Subsequently, Antenatal care coverage has reached 68%, postnatal care 34% and family planning acceptors coverage as measured by the contraceptive acceptance rate has reached 56.2 % in 2008/09. Clean and safe delivery by HEW has increased to 10.8%. There has been an increase in the percentage of deliveries assisted by skilled health personnel reaching 18.4 % from the baseline of 12% with a wide variation among regions [5].

However, maternal mortality is still great public health issue in Ethiopia with its high magnitude. The government and its development partners aim at reducing this maternal mortality. Ideally avoiding maternal death is possible, even in resource-poor countries, but requires information from facilities in which death occurred and /or community at which majority of maternal death take in Gwyneth [6]. However, why mothers die cannot be answered easily; because multiple factors can contribute for their death. This study employs facility based

maternal death review supplemented by focused group discussion. The purpose of this study was to identify the magnitude and factors affecting maternal death, which were not sufficient at different administrative structures in Ethiopia. Thus, this study provided information on magnitude, cause and contributing factors for maternal death at selected hospitals that would be helpful for health manager's programmers and planers to plan and act on reducing maternal mortality in SNNPR, whereas the results of this study will have wider implications for the country at large.

This study aimed in assessment of magnitude, cause and contributing factors for maternal death in three selected hospitals of Southern Nation Nationality People Region (SNNPR), Ethiopia.

2. METHODS

A retrospective register based study was conducted on maternal death in Yirgalem, Welayita Soddo and Arbaminch hospitals, which occurred during 2007 /2008 to 2009/2010.

Source and study population are all deceased mothers due to maternal causes of death recordedin selected hospitals during the study period.

The cases eligible for this study were classified as a maternal death according to the WHO ICD 10 definition [7]; death must have occurred between the time intervals of September 11th of 2007 to September 10th of 2010 G.C and the death must have occurred within the selected Hospitals or/and registered. Data, which are incomplete for cause of death and date of death, were not taken.

Three hospitals having the highest maternal case flow in the region were selected out of 15 government hospitals. All the maternal death that occurred in selected hospitals and recorded in the last three years, and met the inclusion criteria were included.

Data was collected from case records (admission register, case file and delivery register) by using checklist. The checklist was designed to explore profile of the patient, time of admission, diagnosis at the time of admission, mode of delivery, intervention, time of death and cause of death and others. In some cases, patient chart may not found in their usual place in this case registration books were used. Data collectors were midwives from nearby health center and supervisors were instructors from health Science College.

The supervisors in each case of data collection checked the completeness and consistency of the collected data. Finally, the principal investigator checked each questionnaire for the same purpose. Training was given in each hospital for data collector and supervisor on the purpose of the investigation and the importance of obtaining the information without bias. Pre test was conducted in Arbaminch hospital and relevant amendments are made on the questionnaire.

Data were entered and cleaned by using EPI info version 3.5.2 and a descriptive Statistical analysis was performed using SPSS version 16. Quantitative analysis was applied to identify and see any patterns or trends among the women based on a variety of characteristics. Data was summarized and presented using tables and figures. A ninety-five percent confidence interval was

calculated using two population proportions. p value < 0.05 was considered as statistically significant.

The proposal was submitted to the Research Ethical Committee of Addis Ababa University, college of health science for approval. Following the approval, regional health Bureau is informed about the objective of the study through a support letter from the School of Public Health, AAU. Written permission was obtained from each zonal health office and they extend the permission letter to each Hospital.

3. RESULT

3.1. Socio Demographic Characteristics of the Deceased Women

Among the selected hospitals, 127 maternal deaths were recorded. Fifty three (42 %), 53 (42 %) and 21(16 %) of maternal deaths occurred in Yirgalem, Soddo and Arbaminch hospitals, respectively. Mean age of the deceased mother's was 26.4±6.86 years and 45 (35.43%) were age 15-24. Seventy-eight (98.7 %) were married and 84 (82.7%) were from rural area (Table 1).

Table-1. Socio Demographic characteristics of the deceased women in the selected hospitals of SNNPR, Ethiopia, from 2007/2008- 2009/ 2010

Characteristics	Number	Percent
Maternal death in each hospital	(n= 127)	**%**
Yirgalem	53	**42**
Soddo	53	**42**
Arbaminch	21	**16**
Age	(n=127)	
15-19	15	**11.81**
20-24	30	**23.62**
25-29	43	**33.62**
30-34	23	**18.11**
35-39	11	**8.66**
40-44	4	**3.15**
45-49	1	**0.79**
Residence	(n=102)	
Rural	84	**82.3**
Urban	18	**17.7**
Marital status	(n=79)	
Married	78	**99**
Single	1	1

3.2. Maternal Mortality Ratioand Rate

Maternal mortality ratio on average was 1360/100,000 live births, ranging from 230-3622/ 100,000 live birth. In Arbaminch hospital maternal mortality ratio is declining in the three years period, where as for Soddo and Yirgalem hospitals maternal mortality ratio was higher in 2009 (3622 & 2464), respectively(fig.1).

The average maternal mortality rate was 9.24/1000 women in reproductive age. Compared to the baseline; 8.3 per 1000 in (2008), maternal mortality rate has significantly declined to1.5 per 1000 in 2010 using a two population proportion; 95% CI: 6.8(1.6, 11.9) per 1000 in Arbaminch hospital. In the other two study hospitals, maternal mortality rate is almost the same (P >0.05).

Table-2. Maternal mortality ratio/100,000 live births for deceased ??mot hers in Yirgalem, Soddo and Arbaminch hospitals of SNNPR from 2007/2008-2009/2010

	2007/2008			2008/2009			2009/2010		
Hospital	Live birth	maternal death	MMR	Live birth	maternal death	MMR	Live birth	Maternal death	MMR
Yirgalem	1390	15	?1079	974	24	2464	1126	14	1243
Soddo	618	9	1456	635	23	3622	924	20	2164
Arbaminch	1284	11	856	1260	7	555	1302	3	230
Total	3292	35	1093	2869	54	1882	3352	37	1104

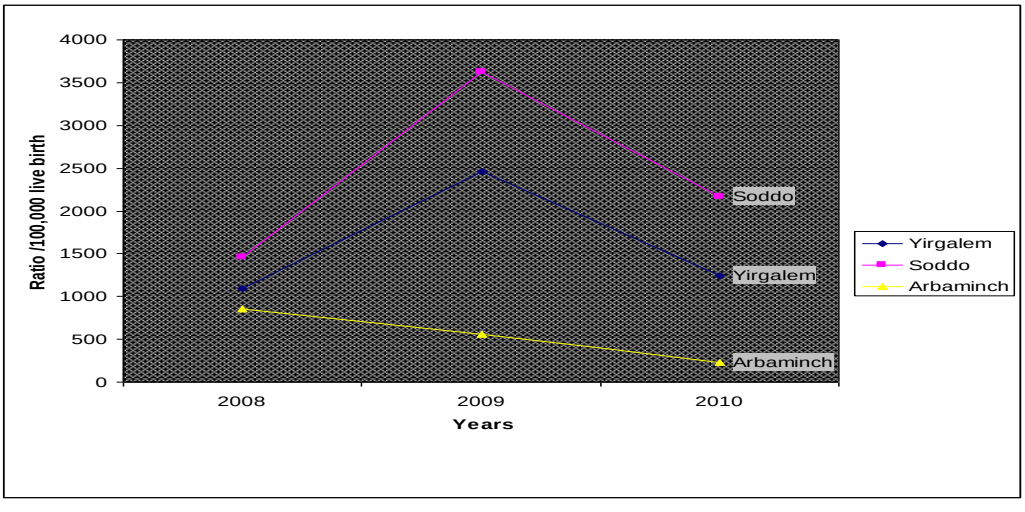

Figure-1. Maternal mortality ratio in selected hospitals of SNNPR, Ethiopia, from 2007/2008-2009/2010.

3.3. Obstetric History of the Deceased Mothers

Twenty-four (25.5%) were grand multi gravid mothers. Thirty (48.4 %) & 26 (42%) were spontaneous vaginal delivery and Caesarian section respectively. Among SVDs 80% (24) n=30 was home delivery. That of home delivery PPH / retained placenta which accounts 58% [8] n=24 cases followed by25% (6) n=24, 17% (4/24) eclampsia and purpural sepsis were respectively. Among the 36 cases of ruptured uterus cases, 42% (15/36) were managed by C/S and the rest, 21(58 %) were treated in other procedures. Moreover, there were 23 cases of ruptured uterus that came after two to three days of labor at home. Ten (43%) were managed by C/S and the remaining 13(57%) would not.

Majority, 87% (75/86) of maternal death occurred in 3rd trimester. Fifty-seven (62 %) get delivered and 39 % (36/93) didn't give birth. Among those who gave birth, 40 % (23/57) gave live birth including home delivery. The remaining 35% (20/57) and 25 % (14/57) were macerated and fresh stillbirths respectively. Concerning time of death, of maternal death 58 %, (65/112) occurred in the post-partum period. (Table 3).

Table-3. Obstetric history of deceased mothers in selected hospitals of SNNPR, Ethiopia, from 2007/2008- 2009/2010

Obstetric history	Number	Percent
Gravidity	(n=94)	
Primigravida	28	30
Multi gravida	42	45
Grand multi gravida	24	25
Gestational age	(n=86)	
1st trimester	5	6
2nd trimester	6	7
3rd trimester	75	87
Types of delivery	(n=62)	
SVD	30	48
Caesarian section	26	42
Forceps	3	5
Vacuum	1	2
Distractive	2	3
Outcome of pregnancy	(n=93)	
Live birth	23	25
Fresh stillbirth	14	15
Macerated stillbirth	20	21
Undelivered	36	39
Event	(n=112)	
Ante partum	23	21
Intra partum	24	21
Post partum	65	58

3.4. Medical Cause of Death

Direct obstetric cause of death accounts for 117 (88%) of the deaths and the indirect cause of death scored 16(12%). Main direct obstetric causes of death were obstructed labor in 44 (33.08%) of cases followed by 31(23.3%) hemorrhage and 20(15.04%) of Eclampsia. Of the indirect causes of maternal death, malaria was the leading 11(8.3%) out of all causes.

Table-4. Cause of maternal death in selected hospitals of SNNPR, Ethiopia, from 2007/2008- 2009/ 2010

Cause of death	Yirgalem (n=56)	Soddo(n=55)	Arbaminch (n=22)	Total	
Direct cause	No	No	No	No	%
Hemorrhage	15	14	2	31	23
APH	4	4	2	10	
PPH/retained placenta	9	8	0	17	
Hypo-volumic shock	2	2	0	4	
Obstructed labour	21	11	12	44	33

Ruptured uterus	16	10	10	36	
Prolonged/labour	2	1	2	5	
Ruptured uterus / Anesthesia	1	0	0	1	
CPD / metabolic emboli	1	0	0	1	
Hand prolaps	1	0	0	1	
Eclampsia	12	8	0	20	15
P. SEPSIS	3	2	5	9	7
PROM	1	0	1	2	
Abortion	3	4	0	7	5
Others	1	4	1	6	5
IUFD	0	3	0	3	
Hyper emesis	1	1	1	3	
Indirect cause	2	12	2	16	12
Malaria	0	9	2	11	
CHF	2	1	0	3	
RVI	0	1	0	1	
Anemia	0	1	0	1	
Total	56	55	22	133	100

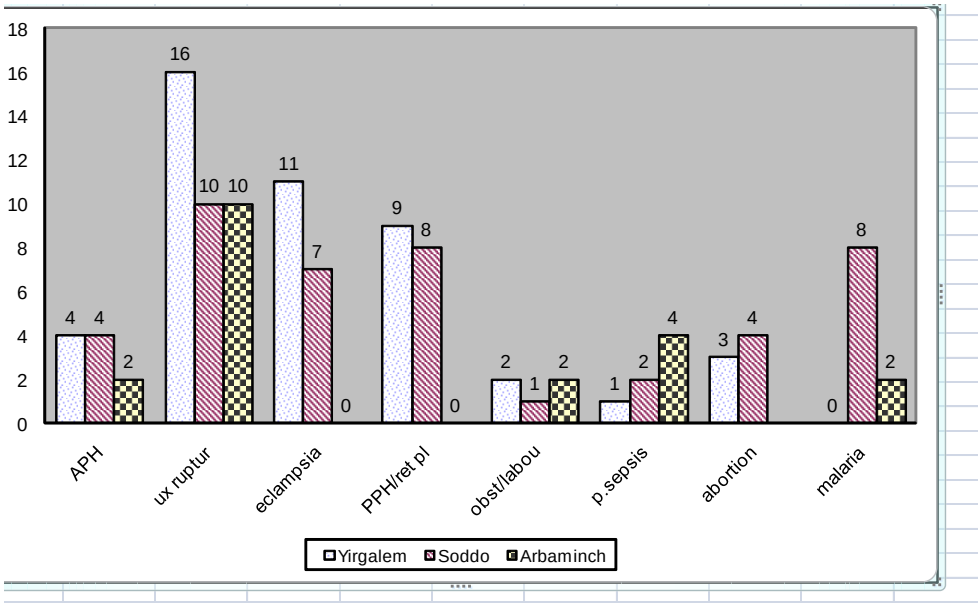

Fig-2. Major cause of maternal death in selected hospital of SNNPR, Ethiopia, from 2007/2008-2009/2010

Among the major direct obestetric causes of maternal deaths,utrine ruptur is the leading in all the three hospitals.in the case of Yirgalem and Soddo hospitals, eclmpsia and retained placenta are the second leading major direct obestetric cause of maternal death (fig 2).

More of maternal deaths 65(58.02%) occurred during post partum period (Fig, 3).

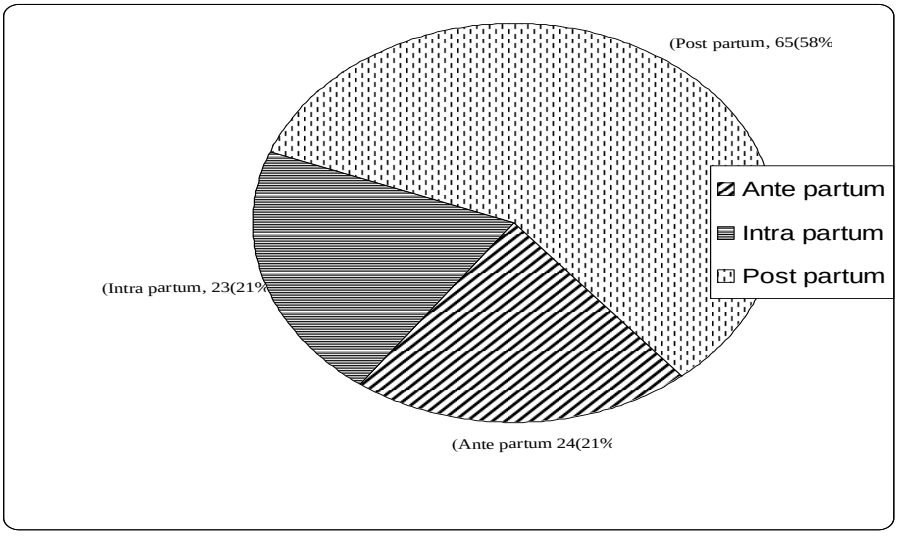

Fig-3. Period in which maternal death occurred in selected hospitals of SNNPR, from 2007/2008-2009/2010

3.5. Patient Factors Related to Maternal Death

Only four, (3.1%) of the deceased mothers had attended the antenatal care. Nineteen (40.42%) and 14(29.79%) were in labour for two and three days, respectively. Ruptured uterus case was the highest in duration of labour at home; out of 36 cases 23(64%) were in labour at home for two to three days. Sixty (48.4%) mothers died in the day of admission.

Table-5. Patient factors related to maternal death for deceased women in selected hospitals of SNNPR, Ethiopia, from 2007/20008-2009/2010

Characteristics	Number	Percent (%)
Antenatal care	(n=109)	
Yes	4	3.8
No	105	96.2
Labour	(n=113)	
Yes	89	78.8
No	24	21.2
Duration of labour at home	(n=47)	
Less than one day	6	12.8
One day	8	17.0
Two days	19	40.4
Three days	14	29.8
FHB	(n=62)	
Positive	11	18
Negative	51	82
Place of delivery	(n=66)	
Hospital Home	40 26	60.6 39.4

3.6. Care Provision in the Hospital that is relatedto Maternal Death

Twenty (32.2%), 17(27.4%), 14(22.6%) and 11(17.8%) were intervened by medication, operation, blood transfusion, and resuscitation, respectively. Twenty-six (42%) of them received more than one types of intervention. Hence, only 10% (1/10) of APH cases, 16 %(3/19) of PPH cases, and 21 %(8/38) of ruptured uterus cases were given blood transfusion. No case of APH was intervened by fluid resuscitation, only 21% (4/19) of PPH cases and 21% (8/38) of uterine ruptured cases received resuscitation with fluid.

To signal function for comprehensive emergency management of obstetric complication all hospitals were complete. Magnesium sulfate was not found in all hospitals. Furthermore, in Soddo hospital there is no blood bank (Table 6).

Table-6. Indicators for emergency obstetric and neonatal care in selected hospitals of SNNPR

Indicators for EOC	Arbaminch	Soddo	Yirgalem
Blood transfusion	Yes	Yes	Yes
Oxytocine	Yes	Yes	Yes
Blood bank	Yes	No	Yes
Magnesium sulfate	No	No	No
Methyldopa	Yes	Yes	Yes
Fluids	Yes	Yes	Yes
Diazepam	Yes	Yes	Yes
Hydralizine	Yes	Yes	Yes
Signal function			
Parenteral antibiotics	Yes	Yes	Yes
Parentral oxytocin	Yes	Yes	Yes
Parentral ant convalescent	Yes	Yes	Yes
Manual removal of placenta	Yes	Yes	Yes
Removal of retained product	Yes	Yes	Yes
Assisted vaginal delivery	Yes	Yes	Yes
Neonatal resuscitation	Yes	Yes	Yes

Ambulance service is available only in Soddo hospital. About service fee, average fee for SVD is 175 birr and for C/S 610 birr. Training on emergency obstetric and neonatal care, minimum of two trained midwives are available in each hospital.

4. DISCUSSION

This study was conducted with the view to assess the magnitude, cause and the factors associated with maternal deaths. Among identified 127 maternal deaths in the selected hospitals, majority of deceased mothers were 82.3% from rural parts of the country, which was 73.5% in similar study in the country [9].

Maternal mortality ratio on average in current study was 1360/100,000 Live birth, ranging (3622-230/100,000 live birth). This finding was higher than national survey EDHS 2005 and 2011, this different result can be explained by the fact that this study was facility based, in which all deaths were taken compared to other community based studies. Additionally it was very high compared to Dare Salaam hospitals, Tanzania [10] which was 218/100,000 live birth, this

difference may be Tanzania have initially lower MMR compared to our country (578/100,000 live births in 2005) and it is lower than Gambia, which was 4,452 per 100,000 live births [11]. The other thing that makes maternal mortality ratio higher in this study may be due to its measurement. In measuring MM ratio, the denominator is live birth that is recorded in the hospital registration book i.e. in case of home delivered mothers admitted due to post partum complication the condition of their baby is not known. As a result, while their mothers are included in the numerator their newborns are not in the denominator. In Arbaminch hospital maternal mortality rate was significantly declining from the base line. This may be, because, with Arbaminch hospital there was a project, which works in maternal mortality reduction, by establishing emergency surgery in rural hospitals and health centers, it may contribute for reduction of maternal mortality ratio. As maternal mortality ratio a processes indicator for the attainment of MDG five the finding of this study specified mach to work in reducing the maternal mortality.

Direct obstetric cause of death accounts for 88% seems higher, compared to other studies elsewhere [8, 10, 12]. This may be due to methods variation in identifying maternal deaths (where current study was limited to cases which were admitted to the obstetrics and gynecology wards), and variation in study area (the previous studies unlike the current study were conducted in private, government hospitals and health centers). Moreover, criteria used by different hospitals to admit cases in the obstetrics and gynecology ward may vary from hospital to hospital.

Major obstetric causes of maternal death were obstructed labour, hemorrhage and Eclampsia, appears to be concurrent with facility based national survey Ethiopia [8] and different to South Kalimantan, Indonesia and Tigry, Ethiopia [9, 13] in which leading cause were hemorrhage and in Dhaka Hospital, Bangladesh, Nicaragua [12, 14] Eclampsia was leading. This finding may be in line with that as it is discussed in the above in current study majority of maternal death occurred in mothers from rural area in which emergency management for obstetric cases are not possible, trial in Arbaminch hospital showed that a redaction of maternal mortality rate by enhancing emergency surgery in rural setup.

Antenatal care follow up was very low in this study (3.8 %). Similar finding was revealed in South Kalimantan [14]. This indicates that the health seeking behaviors was very low and it is evident that, even if every pregnancy is at risk, the current focused ANC is helpful since it provides information on birth preparedness and emergency readiness at individual context.

This study-identified quarter of maternal deaths occurred in grand multi gravid mothers. Family planning is suggested to reduce maternal mortality. If those mothers could have been thought on family planning and had received family planning, quarter of maternal death would have been avoided or at least minimized.

In current study, obstructed labour was the leading cause of death, which may be explained by delay in health seeking behavior of community. Delay in health seeking behavior was seen in 70% of deceased mothers who came to hospital after 2-3 days of labour at home, This finding is supported by a finding of study in Ethiopia *"He will take me there only when the illness becomes serious or when I am close to death"*[15]. Delay in health seeking behaviors was seen in 64% of

ruptured uterus cases in which that they came to hospital after two to three days of labour at home. Out of which 43% was managed by C/S making delay only at home where as 57% were not treated with C/S in this case both delay at home and delay at health institution occurred. Beside this only less than half 42% of ruptured uterus, cases were managed by C/S indicating in appropriate management in the rest of cases (delay at health facility).

Additionally, 82% of deceased mothers were admitted with negative fetal heartbeat. This delay may be due to lack of awareness on danger signs during pregnancy and labour. This finding is in line with the finding that only few, of deceased mothers had ANC follow up.

Near to half of maternal deaths occurred during the first day of admission. This can be regarded as a proxy indicator of delay in health seeking behavior. Therefore, almost half of maternal death could have been avoided if they arrived earlier.

There is an improvement in all three hospitals in provision of maternal care. Previously screening was in the outpatient department emergency room, a bleeding case might die at OPD. Waiting time becomes zero and the door is open for every maternal case for 24 hours including weekend and holyday. Even if there were changes, there is also inappropriate care related to maternal death. It was seen in direct obstetric cases, which are potentially in need of blood transfusion. Ninety percent, 84% and 79% of APH, PPH and ruptured uterus cases respectively, died without receiving blood transfusion when they were in need. This finding may imply that, if they were transfused with blood, this much death could have been avoided. Additionally, no case of APH and only 21% of PPH and 21% of uterine ruptured cases were resuscitated using intravenous fluids other than blood. This finding may indicate delay from health care provider side in providing appropriate type of intervention.

The recommended drug for management of Eclampsia/ pre Eclampsia was magnesium sulfates, but none of the hospitals used this drug, as it was not available. Eclampsia was the third leading cause of maternal death 15%, if the drug had been available in the hospitals; some of the mothers would have been saved. The average fee for normal vaginal delivery and caesarian section were according to current foreign currency it accounts 10 and 35 US dollar respectively. This is unaffordable for majority of Ethiopian people especially for rural society. Making the service free of charge were recommended by National bases line survey on emergency management in Ethiopia [8] where as another study in Ghana, [16] realized the risk of exemption of service fee without increasing the other resources.

In current study unavailability of ambulance service were identified in two of the study hospitals Ambulance service is important for redaction of maternal mortality reduction.

5. CONCLUSION

Maternal mortality ratio generally was high for the three hospitals. Among direct obstetric cause of maternal mortality, obstructed labour was identified as leading cause followed by hemorrhage and eclampsia. Concerning patient factors contributing for maternal death were, delay in health care seeking behavior, which was seen in mothers who come after two to three days of labour at home, mothers who died in the day of admission and who were admitted with

negative fetal heart bit. ANC service utilization was near to nil. Similarly, FP service utilization was also found to be very low; which was seen in death of grand multi gravid mothers. Additionally different forms of socio cultural factors like early marriage, traditional beliefs and values likely to have contribution in maternal mortality. The study revealed that failure by health care providers to institute life saving interventions (IV fluid resuscitation and blood transfusion) for mothers in need. High service charge and in availability of ambulance was also as the other drawback for redaction of maternal mortality.

6. RECOMMENDATION

The government and its partner together with community, make the comprehensive emergency obstetric care service accessible to the rural society in which the majority live. Provide refresher training for health professionals and supportive supervision in maternal service. Much to work on health education to increase the community awareness on birth preparedness emergency readiness, family planning, ANC follow up and institutional delivery. By working with partners should fill a gap in material supplies i.e important drugs and ambulance at least in woreda level. Managers in the hospital should follow the quality of care provided for patients and fulfill the require materials to reduce maternal mortality. Each hospital should have its own maternal death audit or confidential enquiry into maternal deaths in the community and hospitals. Service charge should be minimized for maternal causes to attract the poor. Community related factors that contribute to maternal death should be addressed through health education. Each hospital should have the ready available blood in their blood bank. The community should create a means for those who die at home at emergency condition ie.('eder' for the sick rather than for died). None governmental organizations by funding different programs which help in reducing maternal mortality.

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