

*PERINATAL MORTALITY RATE AND ASSOCIATED FACTORS  
AMONG DELIVERIES IN SHASHEMENE REFERRAL  
HOSPITAL, OROMIA REGIONAL STATES, SOUTH ETHIOPIA.*

*BY: BELAYNEH LETA (MD)*

*THESIS REPORT TO BE SUBMITTED TO THE DEPARTMENT  
OF PEDIATRICS AND CHILD HEALTH, COLLEGE OF PUBLIC  
HEALTH AND MEDICAL SCIENCES, JIMMA UNIVERSITY, IN  
PARTIAL FULFILLMENT FOR THE REQUIREMENTS OF THE  
SPECIALTY CERTIFICATE IN PEDIATRICS AND CHILD  
HEALTH.*

*AUGUST 2016*

*JIMMA, ETHIOPIA*

*PERINATAL MORTALITY RATE AND ASSOCIATED FACTORS AMONG DELIVERIES IN SHASHEMENE REFERRAL HOSPITAL, OROMIA, SOUTH ETHIOPIA.*

*BY: BELAYNEH LETA (MD)*

*ADVISORS:*

*DR NETSANET WORKNEH (ASSOCIATE PROFESSOR OF PEDIATRICS AND CHILD HEALTH)*

*DR GURMESA TURA (PHD, ASSISTANT PROFESSOR OF REPRODUCTIVE HEALTH)*

## **Abstract**

### *Background*

*Perinatal mortality is a sensitive indicator of the quality of health care provided to pregnant women and their newborns. Although Perinatal mortality dramatically declined in developed countries, the progress has been slow in resource poor settings where 99% of the mortality is occurring and still births were not included in MDG's. In resource limited countries like Ethiopia, where perinatal mortality is still significant and the extent hasn't been well known b/c of low facility delivery and poor recording and under reporting.*

### *Method:*

*Cross-sectional study was conducted in Shashemene Referral Hospital between February to August 2016. The data were collected from logbooks and client cards (maternal and neonatal cards) by using a structured data collection tool.*

### *Results*

*A total of 380 cases was included in this analysis. The Perinatal mortality rate was 116 per 1000 total births, of which 86.4% were still births and 16.6% were early neonatal deaths. The proportion of hospital perinatal death was 27.3%. Of the Perinatal deaths, 79.6% of them occurred in mothers admitted with at least one obstetric and medical complication. Obstructed labor, antepartum hemorrhage and hypertensive disorders of pregnancy accounted for more than half of the Perinatal deaths. Lack of antenatal care follow up and labor duration of more than 24 hours, obstructed labor and pregnancy induced hypertension were found to be associated with perinatal mortality.*

### *Conclusion*

*The Perinatal mortality rate observed was higher than other similar hospital based studies in the country and more than twofold of the national estimate of perinatal mortality. Preventable causes of Perinatal deaths like obstructed labor (which accounted for one third of the deaths), hypertensive disorders of pregnancy and antepartum hemorrhage caused more than half of the deaths. Lack of antenatal care follow up and labor duration of more than 24 hours, obstructed labor and pregnancy induced hypertension were found to have a statistically significant association with Perinatal mortality, which indicates poor utilization and/or provision of quality antepartum and intrapartal cares to the mothers which requires further investigation and effective intervention .*

*Key words: - cross sectional, Perinatal mortality, stillbirth, and early neonatal death.*

### **ACKNOWLEDGEMENTS**

*First and foremost, I would like to thank Jimma University, College of Public Health and Medical Sciences, and the department of Pediatrics and child health for giving me the opportunity to do this study and providing me the necessary financial support for the study. I would also like to thank my advisors **Dr Netsanet Workneh** and **Dr Gurmessa Tura** for their support during the research work. Last but not least, I would like to thank all those who helped me in the data collection and analysis process.*

### **LIST OF TABLES**

|  |                                     |
|--|-------------------------------------|
| Table 1 Maternal characteristics of all deliveries .....               | 9                                   |
| Table 2 Fetal characteristics of all births .....                      | <b>Error! Bookmark not defined.</b> |
| Table 3 Maternal characteristics in relation to perinatal deaths ..... | 12                                  |
| Table 4 Fetal characteristics in relation to perinatal deaths .....    | 14                                  |

### **ABBREVIATIONS**

*ANC: Antenatal Care*

*APH: Antepartum Hemorrhage*

*CPD: Cephalopelvic Disproportion*

*C/S: Cesarean section*

*ENND: Early Neonatal Death*

*HIV: Human Immunodeficiency Virus*

*PIH: Pregnancy Induced Hypertension*

*PNM: Perinatal Mortality*

*SB: Still Birth*

*SVD: Spontaneous vertex delivery*

*WHO: World Health Organization*

## ***Table of contents***

|   |                                     |
|---|-------------------------------------|
| <b><i>Abstract</i></b> .....                | iii                                 |
| <b><i>ACKNOWLEDGEMENTS</i></b> .....        | iv                                  |
| <b><i>LIST OF TABLES</i></b> .....          | iv                                  |
| <b><i>ABREVIATIONS</i></b> .....            | iv                                  |
| <b><i>Chapter One</i></b> .....             | 1                                   |
| <i>1.1. Background</i> .....                | <b>Error! Bookmark not defined.</b> |
| <i>1.2. Statement Of the problem</i> .....  | 1                                   |
| <b><i>CHAPTER TWO</i></b> .....             | 2                                   |
| <i>2.2. Significance of the study</i> ..... | 5                                   |
| <b><i>CHAPTER THREE</i></b> .....           | 5                                   |
| <b><i>OBJECTIVE</i></b> .....               | 5                                   |
| <i>3.2 Specific Objective:</i> .....        | 5                                   |
| <b><i>CHAPTER FOUR</i></b> .....            | 5                                   |
| <b><i>Materials and Methods</i></b> .....   | 5                                   |
| <i>4.1. Study design</i> .....              | 5                                   |
| <i>4.2. Study area</i> .....                | 5                                   |
| <i>4.3. Study population.</i> .....         | 6                                   |
| <i>4.4. Sample size</i> .....               | 6                                   |
| <i>4.5. Data collection</i> .....           | 6                                   |
| <i>4.6. Data analysis</i> .....             | 7                                   |
| <i>4.7. Ethical issues</i> .....            | 7                                   |
| <i>4.8. Operational definitions</i> .....   | 7                                   |

|  |    |
|--|----|
| <i>CHAPTER FIVE</i> .....                  | 8  |
| <i>RESULTS</i> .....                       | 8  |
| <i>DISCUSSION</i> .....                    | 14 |
| <i>CONCLUSION AND RECOMMENDATION</i> ..... | 16 |
| <i>REFERENCES</i> .....                    | 17 |

## **Chapter One**

### **1.1. Introduction**

*Perinatal Mortality is defined as intrapartum stillbirths and early (one week) neonatal deaths per 1000 total births.(1. For developing countries, where the survival rate of preterm newborns is very low, the numerator for PMR includes all fetal deaths with gestational age of 28 weeks and above and all neonatal deaths within 7 days of life. For developed countries, however, fetal deaths as low as 20 weeks of gestation and neonatal deaths up to 28 days after birth will be counted for the estimation of the PMR (1).*

*Globally, declines have been observed in infant and child mortality as a result of public health interventions such as immunization and treatment for infectious diseases. However, progress towards reducing perinatal deaths has been slow and negligible. Every year, more than 7 million perinatal deaths occur across the globe (3.5 million stillbirths and 4 million neonatal deaths) (1, 4).*

*About 99% of these perinatal deaths occur in low and middle income countries (1, 4). Unfortunately, approximately half of these perinatal deaths usually occur at home, unnamed and unrecorded, and thus unaccounted for (4, 5). In Ethiopia In 2006, the PMR estimated by WHO was 57/1000 total births with about 2:1 ENNDs to stillbirths ratio (1). Because of the high magnitude of the problem and its direct linkage with the quality of health service during pregnancy, peripartum and in the first month of the neonates' life, PMR and neonatal mortality rate (NMR) are used as an important indicators of the health status of a country (1, 6). Furthermore, neonatal mortality is the major contributor to infant mortality rate (IMR), which was identified as one of the UN Millennium Development Goal indicators (MDG 4). In other words, because more than three-quarters of infant death occur during the first 28 days of life (7, 8), reducing neonatal deaths in high infant mortality countries was taken as the major target of the MDG 4. The importance of perinatal deaths reduction is also emphasized by describing its*

association with maternal mortality. Previous report has shown that for every maternal death, there are an estimated 10 perinatal deaths (9). Furthermore, because of the strong linkage of perinatal deaths with maternal deaths, about two-thirds of the causes of maternal deaths (obstructed labor, sepsis, hypertensive disorders of pregnancy, and antepartum hemorrhage) are also causes of perinatal deaths (10). Specific to neonates, the 2008 global estimation for the major causes of neonatal deaths were preterm birth (29%), infections (25%), and complication of asphyxia (22%) (11). But, in Sub Saharan Africa, the leading cause of neonatal mortality was asphyxia, which was in turn the consequence of poor obstetric care (12). Without describing the possible causes, the 2011 Ethiopian demographic and health survey (EDHS) showed that the infant mortality has declined by 39% over the 15-year period, from 97 deaths per 1,000 live births to 59 deaths per 1,000 live births. However, it was noted that the significant decline in infant mortality was mainly due to more decline in post neonatal mortality than early neonatal mortality (54% vs 24%). More than 40% of the neonatal deaths occurred on the first day of life. According to Ethiopian national newborn and child survival strategy document neonatal causes contribute for more than one third of under-five mortality (asphyxia-14%, prematurity-11%, neonatal infection-9%) of which majority occurs in the first week of life (13).

## **CHAPTER TWO**

### **2.1. Literature review**

A case control study for perinatal mortality was conducted in Hawassa University Hospital between 2008 and 2010. A total of 1356 newborns (452 cases and 904 controls) were included in this analysis. The adjusted perinatal mortality rate was 85/1000 total delivery. Stillbirths accounted for 87% of total perinatal mortality. The proportion of hospital perinatal deaths was 26%. Obstructed labor was responsible for more than one third of perinatal deaths. Adjusted odds ratios revealed that obstructed labor, malpresentation, preterm birth, antepartum hemorrhage and hypertensive disorders of pregnancy were independent predictors for high perinatal mortality. In the subgroup analysis, among others,



*obstructed labor and antepartum hemorrhage found to have independent association with both stillbirths and early neonatal deaths (14)*

*Data for all consecutive deliveries in the labor ward complex of Lagos University Teaching Hospital (LUTH) between June 2002 and November 2002 were obtained from the patients' record and by interviewing the mothers using a questionnaire. The babies were followed up for 7 days post-delivery. There were 51 (8.5%) Perinatal deaths made up of 43 (7.1%) stillbirths (15 fresh and 28 macerated) and 8(6.1%) early neonatal deaths giving a Perinatal mortality rate of 84.6/1000. Maternal factors that significantly affected Perinatal deaths were maternal age, parity, antenatal care booking and the hospital where the mother was booked for antenatal care, number of previous child deaths, and complications of pregnancy. Mode of delivery and complications of labor were the significant intrapartum factors. Fetal factors that influenced Perinatal deaths were fetal presentation, birth weight, and Apgar scores at 1 and 5 min. When multiple logistic regression (multivariable analysis) of Perinatal mortality on possible risk factors was done, only the Apgar score at 5 min, birth weight, and parity were significant risk factors. (15)*

*A secondary analysis of the South African Perinatal Problems Identification Program (PPIP) database for the Province of Mpumalanga was undertaken for the period October 2013 to January 2014, inclusive.*

*There were 23503 births and 687 late perinatal deaths (stillbirths of  $\geq 1000\text{gr}$  or  $\geq 28$  weeks gestation and early neonatal deaths up to day 7 of neonatal life) in the study period. The rate of maternal complication in macerated stillbirths, fresh stillbirths and early neonatal deaths was 50.4%, 50.7% and 25.8% respectively. Mothers in the other late perinatal deaths were healthy. Maternal hypertension and obstetric hemorrhage were more likely in still births ( $p = <0.01$  for both conditions), whereas ENNDs were more likely to have a healthy mother ( $p < 0.01$ ). The main causes of neonatal death were related to immaturity (48.7%) and hypoxia (40.6%). 173 (25.2%) of all late perinatal deaths had a birth weight less than the 10th centile for gestational age. (16)*

*One year study from 1st January to 31st December 2001 was carried out in the Department of Obstetrics and Gynecology, Jinnah Postgraduate Medical Centre, Karachi. During the one year period from 1st January to 31st December, 2001, there were 7743 deliveries and 753 Perinatal deaths. Five hundred and sixty nine were still born and 184 died within 7-days of birth. The Perinatal mortality rate (PNMR) was 97.2/1000 total births and still birth rate 73.4/1000 total births. The leading cause of stillbirth was hypertensive disease of mother in 180 (24%). This included Pregnancy Induced Hypertension (PIH) 106 (14%) and eclampsia 74 (10%). The next common cause was mechanical, accounted for 161 (21.4%).*

*Ante partum hemorrhage (APH) was responsible for 151 (20%) perinatal deaths and low birth weight (LBW) was identified in 108 (14.4%). Congenital malformation caused deaths in 47 (6.2%), maternal medical disorders as jaundice, anemia and diabetes in 24 (3.2%) and neonatal infections as Respiratory Distress Syndrome (RDS), probable pneumonia, bleeding disorders and septicemia caused deaths in 35 (4.8%).(17)*

*Unmatched case control study was conducted in three Municipal hospitals in Dar Es Salam, Tanzania between November 2010 and February 2011. 600 babies (200 cases and 400 controls) were included in the study. Major causes of perinatal mortality included prolonged/Obstructed labour (22%), pre-eclampsia (23%) and prematurity accounting for 18.5% of the perinatal deaths. Mothers of the cases were more likely to have previous adverse pregnancy outcomes, hypertension disorders and premature delivery.(18)*

*A retrospective review of perinatal mortality was conducted over two and half years from September 2012-February 2015 in Jimma University Specialized Hospital. The overall perinatal mortality rate was 109.3/1000 total births with still birth to early neonatal death ratio of 3.6:1. Most of the mothers were: 25-29 years old, para II-IV and had ANC accounting for 30.6%, 60.3%, and 73.8% respectively. More than three fourth of the cases were delivered at term and close to two third of them weighed 2500-3999 gms at delivery. Mechanical factors*

*followed by antepartum hemorrhage, hypertensive disorders of pregnancy and congenital causes initiating the cascade of perinatal death.(19)*

## **2.2. Significance of the study**

*Perinatal mortality is a highly prevalent problem in Ethiopia. Unfortunately, it is not widely studied at regional and national level. Even most of those studies done where death audits, which included only the deaths in the analysis and were not honest enough to evaluate factors associated with Perinatal mortality. Thus recognizing the current stage of the problem and identifying the potential related factors is very important in projecting the possible interventions at local as well as national level so that the point of the problem could be taken down.*

## **CHAPTER THREE**

### **OBJECTIVE**

*3.1 General objective:-To review the Perinatal mortality rate and associated factors in Shashemene Referral Hospital.*

### **3.2 Specific Objective:**

- 1. To determine the perinatal mortality rate in Shashemene Referral Hospital*
- 2. To determine factors associated with perinatal mortality in Shashemene Referral Hospital.*
- 3. To compare the proportions of stillbirths and early neonatal deaths.*

## **CHAPTER FOUR**

### **Materials and Methods**

#### **4.1. Study design**

*Cross sectional survey was carried out utilizing a structured data collection questionnaire from February to August 2016.*

#### **4.2. Study area**

*Shashemene Referral Hospital is found in Oromia, one of the regional states in Ethiopia, 250 kilometers away from Addis Ababa on the road to Hawassa. The Hospital serves as a referral center for a catchment population of approximately 5 million and provides comprehensive maternal and newborn care. Also serves as*

*a training site for residents and Integrated Emergency Surgery & Obstetrics Officers in collaboration with other universities.*

#### **4.3. Study population.**

*All live and still births delivered at the facility from January 2013 to January 2016*

#### **4.4. Sample size and sampling method**

*Based on the previous hospital based study in Jimma University Specialized Hospital, Southwest, Ethiopia, a prevalence of 10% mortality(19) was taken with a margin of error of 3% and 95% confidence level, a minimum sample size needed was calculated using by using single population proportion formula. According to this formula:-*

$$n = Z^2 p(1-p)/d^2 \text{ where}$$

*n=the minimum sample size require*

*Z=the normal standard score corresponding to 95% CI=1.96*

*P=expected prevalence =10%*

*d=marging of error=3%*

$$\text{so } n = (1.96)(1.96)(0.1(1-0.1))/(0.03)(0.03) = 385$$

*since the total delivery of the hospital was 7989 which is less than 10,000, the final sample size was*

*$n_f = n/1 + n/N = 385/1 + 385/7989 = 367$  and 10% contingency was added for incomplete documentation resulting final sample size of 404.*

*Being in is simple random sampling frame, computer generated random number table using excel computer soft ware was used after the delivery registers were numbered from 1 to 7989.*

#### **4.5. Data collection**

*Midwives working in the hospital labor ward were recruited and trained on the objective of the study and demonstrated on how to fill the data collection tool. The*

*data collection tool was pretested before it was finalized for use. It was utilized to gather data on socio-demographic characteristics of the mother, antenatal care, HIV status, gestational age at delivery, mode of delivery, complication detected, birth weight, condition of the baby at delivery and at dismissal. The dependent variable was perinatal death (still births and early neonatal deaths). The questionnaires were checked daily for completeness and consistency and corrections were made*

#### **4.6. Data analysis**

*Data were recorded into the computer using Epi data 3.1 data, software and all necessary checks commands were used to ensure data quality. The card number is used as a unique identifier. The data were exported to SPSS version 21, cleaned and analyzed. Descriptive analysis was done by running frequency distribution. Bivariate analysis was done and odd ratios were applied as a criterion of statistical significance was evaluated at 95% confidence level. A factor that showed association in bivariate analysis (at  $p < 0.25$ ) and potential confounders were included in a multivariable logistic regression model to identify factors that are independently associated with Perinatal death.*

#### **4.7. Ethical issues**

*The study obtained ethical clearance from Jimma University, College of Public health and Medical sciences, ethical review committee and official letter of permission was given to hospital administration and permission letter was obtained from hospital administration and given to concerned units.*

#### **4.8. Operational definitions**

*Stillbirth is defined as fetal death corresponding to 28 weeks of gestation or more with no sign of life at birth, i.e. no breathing, no heartbeat, no movement per 1000 total births.*

*The Early neonatal death rate is defined as the death of a live born within 24 hours of life per 1000 live births.*

*The perinatal mortality rate is defined as the sum of early neonatal death and still birth divided by total births and expressed per 1000.*

## **CHAPTER FIVE**

### **RESULTS**

*Out of 380 deliveries included in analysis, there were 44(11.6%) Perinatal deaths of which of 38(86.4%) and 6(16.4%) were still births and early neonatal deaths respectively. This shows the Perinatal mortality rate was 116/1000 total births with a stillbirth rate of 100/1000 total births and early neonatal death rate of 18/1000 live births.*

*Out of the mothers delivered in the hospital 306 (80.5%) were between the age of 20-34 years while 49 (12.9%) and 25 (6.6%) were under 20 years and 35 or more respectively. 321 (84.5%) of the mothers were from rural and 59 (15.5%) were from urban residential. 266(70%) of the mothers were para II-V and 88(23.2%) and 26(6.6%) were para I and V or more respectively. 350(92.1%) of the mothers were booked for antenatal care at least once while 30(7.9%) of them were not booked for antenatal care at all. The estimated gestational age of 332 (87.9%) were term and 42 (11.1%) and 4 (1%) were preterm and post terms respectively.*

*The mode of labor was spontaneous in 366(96.3%) and induced in 14(3.7%) of the deliveries. 243 (63.9%) of the mothers were admitted after the duration of labor of 24-24 hours and 112 (29.5%) and 25 (6.6%) were admitted before 12 hours and after 24 hours respectively. 9(2.4%) of the mothers were admitted after 18 hours of rupture of membrane. 275 (72.4%) of the deliveries were by SVD while C/S 81 (21.4%), Forceps/vacuum 15 (3.9%) and Laparotomy/destructive 9 (2.4%) makes up the remainder.*

*Among mothers delivered in the hospital, 93 (24.5%) of them were admitted with at least one obstetric and medical complications and 287 (75.5%) of them were admitted with no documented complications. The most common complications observed were CPD 27 (29%), APH 17 (18.3%), malpresentation 17 (18.3%) and PIH 16 (17.2%). 32 (84.2%) of the stillbirths were admitted with a negative fetal heart beat while 6 (15.8%) of them were admitted with a positive fetal heart beat and later reported as stillbirths. 36 (91.7%) of the stillbirths were fresh and 2 (8.3%) were macerated.*

*Out of the birth outcome, 200 (52.6%) were females and 180 (47.4%) were males. 369 (97.1%) of the deliveries were singles and 11 (2.9%) of them were twins. 340 (89.5%) of the births weighed 2500grams or more and 40 (10.5%) of the weighed 1000-2499 grams*

**Table 1. Maternal characteristics of all deliveries**

| <i>Characteristics</i>              | <i>Frequency</i> | <i>Percentage</i> |
|-------------------------------------|------------------|-------------------|
| <b>Maternal age</b>                 |                  |                   |
| < 20 yrs                            | 49               | 12.9              |
| 20-24 yrs                           | 306              | 80.5              |
| 35+ yrs                             | 25               | 6.6               |
| <b>Residence</b>                    |                  |                   |
| Urban                               | 59               | 15.5              |
| Rural                               | 321              | 84.5              |
| <b>Parity</b>                       |                  |                   |
| 1                                   | 88               | 23.2              |
| 2-4                                 | 266              | 70                |
| 5+                                  | 26               | 6.6               |
| <b>ANC</b>                          |                  |                   |
| Booked                              | 350              | 92.1              |
| Unbooked                            | 30               | 7.9               |
| <b>Mode of Labor</b>                |                  |                   |
| Spontaneous                         | 366              | 96.3              |
| Induced                             | 14               | 3.7               |
| <b>Duration of Labor</b>            |                  |                   |
| < 12 hrs                            | 112              | 29.5              |
| 12-24 hrs                           | 243              | 63.9              |
| >24 hrs                             | 25               | 6.6               |
| <b>Duration of rupture membrane</b> |                  |                   |
| ≤ 18 hrs                            | 371              | 97.6              |
| >18 hrs                             | 9                | 2.4               |
| <b>Gestational age</b>              |                  |                   |
| 28-37 wks                           | 42               | 11.1              |
| 37-42 wks                           | 334              | 87.9              |
| >42 wks                             | 4                | 1.0               |
| <b>Mode of delivery</b>             |                  |                   |
| SVD                                 | 275              | 72.4              |
| C/S                                 | 81               | 21.3              |
| Forceps/vacuum                      | 15               | 3.9               |
| Laparotomy/destructive              | 9                | 2.4               |
| <b>Obstetric complication</b>       |                  |                   |
| Yes                                 | 93               | 24.5              |
| No                                  | 287              | 75.5              |
| <b>Observed Complications</b>       |                  |                   |
| CPD(Obstructed labor)               | 27               | 29.               |
| PIH                                 | 16               | 17.2              |

|                                       |     |      |
|---------------------------------------|-----|------|
| <i>APH</i>                            | 17  | 18.3 |
| <i>Malpresentation</i>                | 17  | 18.3 |
| <i>Uterine rupture</i>                | 5   | 5.4  |
| <i>Cord prolapsed</i>                 | 4   | 4.3  |
| <i>OTHERS</i>                         | 7   | 7.5  |
| <b><i>Perinatal death</i></b>         |     |      |
| <i>YES</i>                            | 44  | 11.6 |
| <i>NO</i>                             | 336 | 88.4 |
| <b><i>Type of Perinatal death</i></b> |     |      |
| <i>Still birth</i>                    | 38  | 86.4 |
| <i>Early neonatal death</i>           | 6   | 13.6 |
| <b><i>FHB at admission (SB)</i></b>   |     |      |
| <i>Positive</i>                       | 6   | 15.8 |
| <i>Negative</i>                       | 32  | 84.2 |
| <b><i>Still birth status</i></b>      |     |      |
| <i>Fresh</i>                          | 36  | 91.7 |
| <i>Macerated</i>                      | 2   | 8.3  |

### ***Perinatal mortality by maternal sociodemographic and prenatal characteristics***

*38 (86.4%) of the Perinatal deaths occurred in mothers between the years of 20-34 years. The highest Perinatal death rate 4 (16%) was observed when the mothers were 35 or more years of age. The perinatal mortality rate was higher in primiparous 14 (15.9%) and grand multiparous 7 (26.9%) mothers as compared to multiparous 23 (8.6%) mothers. Perinatal mortality was higher rural residents 39 (12.1%) as compared to urban 5 (8.5%). Higher Perinatal mortality rate occurred in mothers who were not booked for ANC 18 (60%) vs 26 (7.4%) in those who were booked for ANC at least once.*

### ***Perinatal mortality by maternal Obstetric characteristics***

*Those mothers admitted after 24 hours of labor were observed to have higher Perinatal mortality 13 (52%) vs 31 (8.73%) in those admitted before 24 hours of labor. The majority of Perinatal deaths were terms 31 (70.5%) but the Perinatal mortality rate was higher in preterms 12 (28.6%) and post terms 1 (25%) vs 31*



*(9.3%) in term deliveries. Perinatal mortality was higher in mothers who were admitted with at least one obstetric and medical complications 35 (37.6%) vs 9 (3.1%) in those with no documented complications. This means 79.6% of all the perinatal deaths occurred in mothers who were admitted with at least one complication. Of the complications CPD with or without uterine rupture was attributed for more than one third of the cases. Compared to mothers with no complication highest perinatal mortality was observed in mothers admitted with PIH (56.3%) followed by CPD (44.4%) except for uterine rupture and cord prolapsed where all were still births.*

### ***Perinatal mortality by fetal characteristics***

*Perinatal deaths for male and female births were 18 (10%) and 26 (13%) respectively. Higher Perinatal mortality occurred in births weighed 1000-2499 grams 11 (27.5%) vs 33 (9.7%) in those weighed 2500 grams or more and more in twins 2 (18.2%) vs 42 (11.4%) in single deliveries. With 6 early neonatal deaths and 6 stillbirths admitted with positive fetal heartbeat, the hospital mortality rate was 27.3.*

***Binary logistic regression analysis was performed to establish the association between Maternal and Fetal characteristics and perinatal deaths.***

*Both crude and adjusted analysis showed that unbooked for antenatal care(AOR 15.0106, 95%CI 3.955-56.436), labor duration more than 24 hours(AOR 15.540,95%CI 3.675-34.143) and presence of obstetric complications(AOR 10.059,95%CI 2.752-36.768) were associated with increased perinatal mortality. Of the obstetric complications, both crude and adjusted analysis showed that obstructed labor (AOR 5.208 95%CI 1.308 - 20.729) and pregnancy induced hypertension (AOR 6.330, 95%CI 1.054-36.011) were independently associated prenatal mortality.*

**Table 2. Maternal characteristics in relation to perinatal deaths**

| <i>Variable</i>                     | <i>Frequency (%)</i> | <i>Perinatal death (%)</i> | <i>COR 95%CI</i>     | <i>AOD 95%CI</i>         |
|-------------------------------------|----------------------|----------------------------|----------------------|--------------------------|
| <b>Maternal age</b>                 |                      |                            |                      |                          |
| <i>&lt; 20 yrs</i>                  | 49(12.9)             | 2(4.1)                     | 0.3(0.07-1.286)      |                          |
| <i>20-24 yrs</i>                    | 306(80.5)            | 38(12.4)                   | 1                    |                          |
| <i>35+ yrs</i>                      | 25(6.6)              | 4(16)                      | 1.343(0.437-4.128)   |                          |
| <b>Residence</b>                    |                      |                            |                      |                          |
| <i>Urban</i>                        | 59(15.5)             | 5(8.5)                     | 1                    |                          |
| <i>Rural</i>                        | 321(84.5)            | 39(12.1)                   | 1.494(0.563-3.960)   |                          |
| <b>Parity</b>                       |                      |                            |                      |                          |
| <i>1</i>                            | 88(23.2)             | 14(15.9)                   | 1.99(0.979-4.080)    | 0.137(0.691-7.412)       |
| <i>2-4</i>                          | 266(70)              | 23(8.6)                    | 1                    | 1                        |
| <i>5+</i>                           | 26(6.8)              | 7(26.9)                    | 3.892(1.481-10.230)  | 0.771(0.160-3.7100)      |
| <b>ANC</b>                          |                      |                            |                      |                          |
| <i>Booked</i>                       | 350(92.1)            | 26(7.4)                    | 1                    | 1                        |
| <i>Unbooked</i>                     | 30(7.9)              | 18(60%)                    | 18.692(8.130-42.977) | 15.0106(3.955-56.436)*** |
| <b>Mode of Labor</b>                |                      |                            |                      |                          |
| <i>Spontaneous</i>                  | 366(366)             | 43(11.7)                   | 1                    |                          |
| <i>Induced</i>                      | 14(3.7)              | 1(7.1)                     | 1.731(0.221-13.5610) |                          |
| <b>Duration of Labor</b>            |                      |                            |                      |                          |
| <i>&lt; 12 hrs</i>                  | 110(28.9)            | 9(8.2)                     | 1                    | 1                        |
| <i>12-24 hrs</i>                    | 245(64.5)            | 22(9)                      | 0.823(0.380-1.783)   | 0.101(0.037-3.142)       |
| <i>&gt;24 hrs</i>                   | 25(6.6)              | 13(52)                     | 9.947(3.654-27.078)  | 15.540(3.675-34.143)***  |
| <b>Duration of rupture membrane</b> |                      |                            |                      |                          |
| <i>≤ 18 hrs</i>                     | 371(97.6)            | 38(10.20)                  | 1                    |                          |
| <i>&gt;18 hrs</i>                   | 9(2.4)               | 6(66.7)                    | 7.562(4.211-72.9420) | 1.209 (0.139-10.508)     |
| <b>Gestational age</b>              |                      |                            |                      |                          |
| <i>28-37 wks</i>                    | 42(11.1)             | 12(28.6)                   | 3.910(1.820-8.399)   | 1.268(0.071-22.516)      |
| <i>37-42 wks</i>                    | 334(87.9)            | 31(9.3)                    | 1                    |                          |
| <i>&gt;42 wks</i>                   | 4(1.1)               | 1(25)                      | 3.258(0.329-         | 1.176(0.048-             |

|                               |           |          |                       |                         |
|-------------------------------|-----------|----------|-----------------------|-------------------------|
|                               |           |          | 32.275)               | 23.160)                 |
| <b>Obstetric complication</b> |           |          |                       |                         |
| <b>Yes</b>                    | 93(24.5)  | 35(37.6) | 12.863(5.926-27.923)  | 10.059(2.752-36.768)*** |
| <b>No</b>                     | 287(75.5) | 9(3.1)   | 1                     | 1                       |
| <b>Observed Complications</b> |           |          |                       |                         |
| <b>NONE</b>                   | 287(75.5) | 9(3.1)   | 1                     | 1                       |
| <b>CPD (Obstructed labor)</b> | 27(7.1)   | 12(44.4) | 14.333(5.487-37.4400) | 5.208(1.308-20.729)*    |
| <b>PIH</b>                    | 16(4.2)   | 9(56.3)  | 12.9(4.603-36.129)    | 6.330(1.054-36.011)*    |
| <b>APH</b>                    | 17(4.5)   | 4(23.5)  | 8.821(2.397-32.459)   | 2.310(0.391-13.665)     |
| <b>Malpresentation</b>        | 17(4.5)   | 2(11.8)  | 1.911(0.227-16.091)   | 1.806(0.312-19.314)     |
| <b>OTHERS</b>                 |           |          |                       |                         |
|                               | 7(1.8)    | 1(14.3)  | 2.344(0.714-9.143)    | 3.741(0.663-12.129)     |

\* $p < 0.05$ , \*\* $p < 0.001$  \*\*\* $p < 0.0001$

**Table 3. Fetal characteristics in relation to perinatal deaths**

| <i>Variable</i>                | <i>Frequency (%)</i> | <i>Perinatal death (%)</i> | <i>COR 95%CI</i>     | <i>AOD 95%CI</i>    |
|--------------------------------|----------------------|----------------------------|----------------------|---------------------|
| <b>SEX</b>                     |                      |                            |                      |                     |
| <i>Male</i>                    | 180(47.4)            | 18(10)                     | 1                    |                     |
| <i>Female</i>                  | 200(52.6)            | 26(13)                     | 0.774(0.393-1.407)   |                     |
| <b>Birth weight</b>            |                      |                            |                      |                     |
| <i>1000-2499grams</i>          | 40((10.5)            | 11(27.5)                   | 3.529(1.615-7.703)** | 1.268(0.071-22.516) |
| <i>≥2500 grams</i>             | 340(89.5)            | 33(9.7)                    | 1                    | 1                   |
| <b>Gestation/type of birth</b> |                      |                            |                      |                     |
| <i>Single</i>                  | 369(97.1)            | 42(11.4)                   | 1                    |                     |
| <i>Twin</i>                    | 11(2.9)              | 2(18.2)                    | 1.843(0.473-10.112)  |                     |

**DISCUSSION**

*This study revealed a perinatal mortality rate of 116/1000 total births, of which 86.4% were still births and 13.6% were early neonatal deaths. This figure is higher compared to the results obtained in nearby Hawassa referral hospital for Perinatal mortality rate, which was 90/1000 total births, but the proportion of stillbirths and early neonatal deaths were nearly similar (87.2% and 12.8%) respectively (14). It is nearly similar to the result obtained in the Jimma University Specialized Hospital, which showed gross Perinatal mortality rate of 109.3/1000 total births (19). This result is more than two times higher than the national community based estimate of Perinatal of morality which was 46/1000 live births (1). This may be a reflection of the fact that the hospital receives referrals of complicated cases from lower levels of care.*

*In developed communities with good Perinatal care, the stillbirth and early neonatal mortality rates are about equal giving a stillbirth to early neonatal death (SB: ENND) ratio of about 1. However, in poor communities within adequate prenatal care, the stillbirth rate doubles usually at least the early neonatal death rate (15). The still birth to early neonatal death ratio of 6:1 is a clear indication of poor prenatal care. This figure is nearly similar to still birth to early neonatal death ratio of 7:1 obtained from Hawassa*

(14). 91.7% of the still births obtained in this study were fresh. Still birth if fresh indicate intrapartum deaths, but if macerated could be because of pregnancy complication, maternal disease or unknown (18). A majority of stillbirths being fresh in this study indicates utilization and provision of quality obstetric care is not good enough and all necessary efforts must be made to improve this to reduce still birth rate drastically.

Two thirds of early neonatal deaths which occurred in 24 hours were term and normal birth weight, which mainly indicates asphyxia as a primary cause of death, which is also poor intrapartum care and inadequate care for high risk newborns.

As this few previous studies done in this and other developing countries(14, 15,17,19) have shown, the majority of perinatal deaths were primarily due to mechanical factors like obstructed labor, 70% and 75% of the perinatal deaths in this study were term and normal birth weight respectively unlike the developed nations where prematurity and low birth weight were the major contributors of few occurring prenatal deaths(14).This doesn't necessarily mean that prematurity and low birth weight has not been a problem been a problem as this retrospective data picks mainly those neonates before discharge especially in the first 24 hours.

Obstructed labor with or without uterine rupture accounted for more than one third of perinatal deaths which is similar to other studies in the country (14, 19).It has been proved in developed nations that perinatal mortality due to mechanical causes is preventable (14). The implication is, if those women who developed perinatal deaths due to mechanical factors were provided optimal intrapartum care, almost all babies could have been salvaged.

Of the perinatal deaths 79.6% were delivered from mothers with at least one obstetric complication. This is nearly similar to the result obtained in Hawassa Referral Hospital which was 82.1 %( 14). Of the complications obstructed labor, antepartum hemorrhage and pregnancy induced hypertension attributed for more than half of the perinatal deaths.Perinatal mortality was found to have statically significant association with obstructed labor and hypertensive disorders of pregnancy. This is consistent with other previous reports (14, 17, and 19).

*Having persistently high perinatal as it has been before, mainly from rural areas, definitely reflect the underutilization of obstetric care probably because of big delay in health care seeking behavior, inaccessible or poor capacity of health facilities. This study showed more than three fourth of mothers had been in labor for at least for 12 hours before arrival to the hospital which One fourth of them with at least one obstetric complication indicates the delay which could be due to geographical, financial or behavioral barrier which needs further investigation.*

### **STRENGTH**

*Despite its limitation this study comprehensively included all major possible maternal and fetal factors which can be associated with perinatal mortality and data quality is assured during collection and data entry. It also addresses perinatal mortality at three stages (still birth on arrival, still birth in the hospital and early neonatal deaths).*

### **LIMITATION**

*This study being hospital based, the results is not generalizable .In this study neonatal death was considered for first 24 hours only due to inaccessibility of data for deaths beyond 24 hours as they are not reportable .This would under estimate early neonatal deaths.*

### **CONCLUSION**

- The Perinatal mortality rate among deliveries at Shashemene Referral Hospital is found to be high compared to the previous hospital based studies and more than two fold of the national estimate of perinatal mortality.*
- Preventable causes of perinatal deaths like obstructed labour (which accounted for one third of the deaths), hypertensive disorders of pregnancy and antepartum hemorrhage were associated with more than half of the deaths.*

- *Lack of antenatal care follow up and labor duration of more than 24 hours, obstructed labor and pregnancy induced hypertension were found to have statistically significant association with perinatal mortality which indicates poor utilization and/or provision of quality antepartum and intrapartum cares to the mothers.*

### **RECOMMENDATION**

- *Detail investigation of the causes for poor utilization and/or provision of quality antepartum and intrapartum and designing best possible interventions are needed to reduce the burden of perinatal mortality.*

### **REFERENCES**

1. *World Health Organization (WHO). Neonatal and perinatal mortality: country, regional & global estimates. Geneva, Switzerland, 2006.*
2. *Onwudiegwu, U. and Awowole, I. 2012. Current trends in perinatal mortality in developing countries: Nigeria as a case study, Perinatal mortality, Dr. Oliver Ezechi (Ed.), ISBN: 978-953-51-0659-3. Croatia: InTech Europe.*
3. *Ezechi, O. C. and David, A. N. (2012). Overview of global perinatal mortality, Perinatal mortality, Dr. Oliver Ezechi (Ed.), ISBN: 978-953-51-0659-3, Croatia: InTech Europe.*
4. *WHO Perinatal and Neonatal Mortality for the Year 2000. Country, Regional and Global Estimates. WHO; Geneva: 2006.*
5. *Lumbiganon P, Panamonta M, Laopaiboon M, Pothinam S, Patithat N. Why are Thai official perinatal and infant mortality rates so low? Int J Epidemiol 1990; 19:997-1000.*
6. *Richardus JH, Richardus JH, Graafmans WC, Verloove-Vanhorick SP, Mackenbach JP. The perinatal mortality rate as an indicator of quality of care in international comparisons. Med Care 1998; 36(1):54-66.*
7. *Lawn JE, Cousens S, Zupan J. 4 million deaths: When? Where? Why? The Lancet, 2005; 365 (9462):891 – 900.*

8. *World health report 2005. Make every mother and child count. Geneva: WHO; 2005.*
9. Campbell O, Koblinsky M, Taylor P. *Off to a rapid start: appraising maternal mortality and services. Int J Gynecol Obstet 1995; 48 (Suppl):S33–S52.*
10. *World Health Organization's. Neonatal and perinatal mortality, 2004: country, regional and global estimates. Geneva: World Health Organization, 2007*
11. Black ER, Cousens S, Johnson HL, et al. *Global, regional, and national causes of child mortality in 2008: a systematic analysis. Lancet 2010; 375: 1969–87*
12. UNICEF. *Levels and trends in child mortality report. UNICEF 2010*
13. *Ethiopian National child newborn and child survival strategy summary document for 2015/16-2019/20:3*
14. Yifru Berhan, Getachew Bayou. *case control study of perinatal mortality and associated factors in Awassa university hospital, 2008-2010. Ethiop J Health Sci 24: 29-40*
15. ENEkure, VC Ezeaka, E Iroha, MTC Egri-Okwaji. *Prospective audit of perinatal mortality among newborn babies in a tertiary health center in Lagos, Department of Paediatrics, Lagos University Teaching Hospital, Lagos, Nigeria. Nigerian Journal of clinical practice (2011), issue 1.*
16. Emma R. Allanton, Mari Muller and Robert Pantinson *Causes of perinatal mortality and associated maternal complications in a South African province: challenges in predicting poor outcomes. Allanton, et al BMC pregnancy and child birth(2015) 15:37*
17. Razia Korejo, Shereen Bhutta, Khurshid J. Noorani, Zulfiqar A. Bhutt. *An audit and trends of prenatal mortality at Jinnah post graduate medical, vol 57, No4, April 2007.*
18. Rose Mpembani, Jonathan R, Mughamba J (2014). *Perinatal mortality and associated factors among deliveries in three municipal hospital of Dar Es Salaam Tanzania. J Pediatric Neonatal care 1(4):00022. DOI:10.15406/jpnc.2014.01.0000228.*
19. Aseffa D, Akessa GM, Araya F, Amenu D, Girma W, et al (2016). *pattern of Perinatal mortality among deliveries at Jimma University Teaching Hospital, south-west Ethiopia J Womens Health issues care 5:6*



## **ANNEXES**

### *Questionnaire*

1. Region.....health  
facility.....card no.....  
year.....

### *Demographic data*

2. Age of the mother a. < 20 years b. 20-34 years c.  $\geq 35$  years

3. Residence a. Urban b. Rural c. not stated

### *Obstetric and fetal characteristics*

4. State of parity a. 0(primi) b. 1-4 c. 5+ d. not stated

5. ANC status a. booked b. unbooked c. not stated

6. Screening for HIV infection a. yes b. no c. not stated

7. If yes to (8), what was the result a. positive b. negative

8. Mode of labour a. Spontaneous onset b. Induced labour

9. Duration of labour a. <12 hours b. 12-24 hours c. >24 hours

10. Duration of rupture of membrane a. < 18 hours b.  $\geq 18$  hours

11. Mode of delivery a. SVD b. C/S c. forceps/vacuum d. other,  
specify.....

12. Was their Perinatal death?.a. yes b. No

13. If yes to q12, it was a.still birth b. early neonatal death

14. If still birth, FHB at presentation was a. positive b.negative

15.Still birth status b. fresh c. macerated

16. What was the birth weight for all deliveries?.

A. 1000-1499g    b. 1500-2499g    c. 2500-3999g    d.  $\geq 4000g$     e. not measured

17. What was the gestational age for all deliveries?.(LNMP, U/S, Fundal height)

a. 28-37 weeks    b. 37-42 weeks    c. >42 weeks    d). not stated

18. Sex of all births a. Male    b. Female

*Obstetric Complications*

19. Were there any maternal obstetric complication?.

a. yes    b. no    c. not stated

20. If yes to (22), what was the complication?.

a. preeclampsia

b .eclampsia

c. APH

d. obstructed labour

e. uterine rupture

f. malposition /presentation

g. sepsis

h. other complications, specify.....