

## Perinatal Mortality and associated Factor in Jimma University Specialized Hospital, South West Ethiopia

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### Abstract

**Background:** Ethiopia is one of country with highest perinatal mortality among Sub-Sahara region. The aim of this study to determine perinatal mortality and associated factors in Jimma University specialized Hospital.

**Methods:** A cross-sectional hospital based study done for one year in Jimma university teaching hospital. Structured questionnaires were used to collect maternal demographic characteristics, reproductive performance, mode delivery and neonatal outcome at discharge and maternal chart were revised to document weight and Apgar score. Data were entered cleaned and analyzed using SPSS 16 version.

Binary logistic regression performed to see the existence of association between dependent and independent variable. Finally multivariate logistic regression model used to identify independent predictor of perinatal outcome.

**Results:** During the study period, there were 3786 new born were delivered. Among them 372 babies were either still birth or dead within a week making perinatal mortality 98.2/1000 births. Being lack of antenatal care (AOR, 2.86; CI 1.96-3.33), malpresentation (AOR ,5.96; CI 2.11-16.86) and vaginal breech delivery are important determinant factors for perinatal mortality.

**Conclusion:** In general perinatal mortality in sub-Saharan Africa unacceptable high. The main contributing factor for high perinatal mortality are avoidable with good antenatal care, referral system and intrapartum supervision

**Keywords:** Perinatal mortality; Associated factors; Perinatal asphyxia; Ethiopia

### Background

The perinatal mortality rate (PMR) is determined by including all stillbirths and neonatal deaths in a given time period over the total number of births multiplied by thousand. The perinatal period is the most vulnerable period in the life of an individual and the rate of death during this period is higher than at any other period of life [1]. Perinatal mortality is used as one of the indicators of the quality of health provided during the ante natal and perinatal period [2]. Globally about 136 million births occur every year, and of these approximately 3.7 million die during the neonatal period and 3.3 million are stillbirths [3]. Perinatal mortality is at an unacceptably high level in low income countries, especially those in sub-Saharan Africa and south central Asia [1,2]. Achievement of low perinatal mortality requires focus on antenatal, intrapartum and postpartum perinatal and maternal care. Pre-term birth, infection, hypertensive diseases and intrapartum asphyxia is frequently cited as the most common contributors to perinatal mortality in low and middle income countries [3,4].

About 99% of the world perinatal death occurs in low and middle income countries. Deferent reports and studies showed that approximately half of these perinatal mortalities occur at home, unnamed, unrecorded and un accounted [5,6]. As result of the

reported high perinatal mortality still undermine the true mortality in low and middle income countries where vital registration is not available.

In sub-Saharan Africa there is high maternal and perinatal mortality which is unacceptable. Ethiopia is one of sub-Saharan country with high perinatal mortality which account 4% of the world perinatal mortality [7]. According to the 2006 WHO estimation the perinatal mortality 57/1000 total births with about 2:1 ratio still birth to early neonatal death (ENND) [8]. The importance of perinatal death reduction is also describing its association with maternal mortality. A number of studies showed that for every maternal death, there are an estimated 10 perinatal death [9,10]. Because of the strong linkage of perinatal death with maternal death, more than 80% maternal death (obstructed labor, puerperal sepsis, hypertensive disorder of pregnancy and hemorrhage) are also cause of perinatal death [8].

Specific to early neonatal death, the 2008 global estimate for the major cause of early neonatal death were preterm 29%, sepsis 25% and complication of asphyxia. However, the situation in sub-Saharan Africa deviated from the above study; asphyxia is the leading cause of early neonatal death which is consequence of poor obstetric care [9-13].

According to Ethiopia demographic and healthy survey showed decline in perinatal mortality 37/1000 total birth in 2005 and 46/1000 total births which has big gap in different institutional based studies in different part of country.

According to best of author's knowledge, there is no study about perinatal mortality and associated perinatal mortality in Jimma university specialized Hospital in the last 20 years.

## Methods and Materials

A cross-sectional hospital based survey was conducted among all women who gave birth in labor and maternity ward in Jimma university specialized Hospital (JUSH) from September 11, 2012-September 10, 2013. Jimma town and nearby woreda (district) make Jimma zone. Jimma zone located south west of Oromia region with estimated population of 15 million. The town located 346 km the capital, Addis Ababa. JUSH is one of teaching medical school of the country. It has both undergraduate and postgraduate programmed paramedical and medical department. The hospital gave healthy service as inpatient and outpatient level as being referral center for 15 million populations in south west region of the country. It has labor, maternity and genecology ward. Labor and maternity ward have 50 beds give 24 hours service for total 3697 delivery per year. Service is given by six senior obstetrician and gynecologist, 23 residents and midwives and nurses.

A structured checklist was used to collect data which is developed after reviewing relative literature and similar studies. The checklist prepared in English which contain reproductive status, type of complication of pregnancy mode of delivery, maternal and national out came

Data was collected by 10 obstetrics and gynecology year 2 residents after giving information on topics and neonates followed till discharged from maternity ward or neonatal NICU.

After data collection each checklist checked for completeness. Code was given before data entry. Data entered, cleaned for outliers, missed values, and missed variables and analyzed using SPASS 16 versions statically package. Different frequency tables used to describe the study variables. Binary logistic regression performed to see the existence of association between dependent and independent variable. Finally stepwise logistic regression model was used to identify independent predictor of perinatal outcome. Variables which had on bivariate P value<0.05 were entered for the multivariable logistic regression model. Interaction between variables was tested and reported. P value<0.001 was used to declare statistical significance. Ethical clearance was obtained from college of public health and medical sciences.

## Results

### Perinatal mortality

Among 3786 babies, 3518 (92.9%) and 268 (7.1%) babies were live and still birth at times of birth respectively. 104 (3%) babies were delivered with sign of life and died in first week of life. Among the dead in early neonatal period, 78 (75%) singleton, 17 (16.3%) twin and nine (8.7%) triplet were died in Neonatal Intensive Care Unit (NICU).

Variable	Total number of births	Number (PMR/1000 total births)	Number (ENND 1/1000 live births)	Number (still birth 1/1000 total births)	
Address	Jimma	1566	66.4	27 (16.8)	59 (38.2)
	Outside Jimma	2220	98	77 (38.8)	210 (97.6)
ANC	Yes	2969 (78.4)	73.4	64 (24.1)	140 (69)
	No	817 (21.6)	243.9	40 (50)	129 (46)
Number of babies	Single	3618	94.7	80 (22.6)	267 (46.0)
	Twins	156	101.3	15 (96.2)	2 (12.8)
	Triplets	12	750	9 (750)	00
Sex	Male	2067	95.2	59 (28.4)	155 (79.2)
	Female	1719	87.4	45 (26.4)	113 (79.1)
Gestational age	Preterm	37	108	10 (185.2)	3 (88.2)
	Term	984	56.7	19 (19.4)	40 (42.4)
	Post term	112	71.4	3 (26.9)	6 (56.6)
	Unknown	2653	104.5	72 (28.1)	220 (93.9)

**Table 1:** Specific perinatal mortality rate, ENND, still birth rate/1000 total birth in Jimma University specialized Hospital by sociodemographic characteristics September, 2011 to September 11, 2013.

93 (89.4%) babies were died in NICU with possible causes of early neonatal sepsis 40 (43.0%), respiratory distress 31 (33.3%), birth asphyxia 22 (23.2%). 68 were died within 72 hours after delivery and other died in labor ward or operation theatre immediately after delivery.

The gross and corrected (excluding congenital anomaly incompatible with life and birth weight<1000 gm) prenatal mortality of the year were 98.2 and 95.4./1000 total birth respectively.

The gross and corrected ENND rates were 29.7 and 27.4 /1000 live birth respectively. The higher ENND rates were seen in those from

higher gestation, grand multityparous 750 and 442 per southland live birth and those neonates had been very low birth and low birth weight, 317 and 117 respectively. Lethal congenital anomaly was least contribution for perinatal death rate (3/1000 total birth) in this study.

Variable	Total births	PMR/1000 total births	Number (ENND 1000 live births)	Number (still birth 1000 totla births)
Mode of delivery	SVD	2373	53 (18.6)	91 (40.9)
	Vaccum	64	3 (47.6)	NA
	Forceps	229	15 (67.0)	NA
	C/D	917	19 (20.7)	2
	Ass. Breech	42	19 (21.5)	21 (25.7)
	Destructive	54	NA	54 (482)
	Laparotomy	108	NA	2 (981.5)
	Birth Weight	1000-1499	45	10 (319.0)
1500-2499		425	51 (117.8)	38 (123.4)
2500-3999		3216 (84.5%)	41 (24.4)	204 (82.6)
>4000		100 (2.7%)	2 (20)	8 (87.0)
Maternal age	<20	249 (6.7%)	11 (44.2)	24 (96.4)
	20-34	3270 (86.3%)	86 (226.3)	224 (68.5)
	>34	267 (7.0%)	7 (26.2)	30 (112.4)

\*PMR: Perinatal Mortality, \*NA: Not Applicable, \*ENND: Early Normal Death, \*Ass: Assisted, \*laper: Laparotomy

**Table 2:** Specific perinatal mortality rate, ENND, still birth rate/1000 total birth in Jimma University specialized Hospital by sociodemographic characteristics September 1, 2012 to September11, 2013.

The gross and adjusted still birth rate 64.7 and 61.7/1000 total birth respectively. Still birth rate was in those women had been diagnosed uterine rupture, obstructed labor, age group of between 20-34 and those still born with very low birth weight in order of 982, 482, 236 and 222.2 per thousand respectively. Almost half of causes of still births were mechanical factors like uterine rupture, obstructed labor and mal presentation and other one third the causes were unexplained (Tables 1 and 2).

Variable	Frequency		Bivariate		Multivariate	
	Alive (%)	Dead (%)	COR	CI	AOR	CI
Address	n=1566	n=2220				
Jimma	1480 (94.5)	86 (5.5)	1	1	1	1
Outside Jimma	1933 (87.1)	287 (12.9)	2.572	1.987-3.329*	1.198	0.86-1.669
ANC	n=3413	n=373				
Yes	2765 (93.1)	204 (6.9)	1	1	1	1

### Factors associated with perinatal mortality

Logistic regression models were built and analyzed the following variables, address, parity, maternal, age, risk associated with mother, gestational age, weight, mode of delivery presentation and sex. The associated factors with perinatal mortality were no antenatal care, place of residence, presentation, mode of delivery, multiparous, severe preeclampsia, weight and diagnosis at arrival. Those mothers who live outside Jimma is three times higher than for those who live Jimma, to give birth dead fetus or dead in first week (AOR 2.861, CI, 1.99-3.33). Those mothers who had no ante partum follow up twice chance of perinatal loss as compared to those who had it (AOD 2.05, CI 1.48-2.87). The perinatal loss 5.9 times risk in shoulder and 4 times assisted vaginal breech delivery as compare to cephalic presentation and spontaneous vaginal delivery (AOR 5.95, CI 2.11-16.86, AOR 4.06, CI 1.856-8.912) respectively (Table 3). The perinatal death was increase 5 times in very low birth weight as compared to those who had normal birth weight (AOR 5.03, 1.63-15.00).

Factors associated with perinatal mortality in bivariate and multivariate tables summarized in Tables 4 and 5.

A prenatal mortality	Numbers	%	Case fatality (%)
<b>Mechanical</b>	121		
Malpresentation	12	5.2	8.7
Uterine rupture	108	20.9	98.1
Obstructed labor	54	17.1	54.9
Multiple gestation	19	0.9	12.2
Prematurity	17	5.9	46
<b>Preeclampsia/Eclampsia</b>	8	2.7	4.7
<b>Ante partum hemorrhage</b>	3	2.8	3.6
<b>Neural tube defect</b>	6	2.8	100
<b>Multiple congenital anomalies</b>	1	0	100
<b>Maternal disease</b>	3	0.1	0.5
<b>Unexplained</b>	85	29.6	

\*obstructed labor: is failure pass the fetus through birth canal despite adequate uterine contraction, mainly mechanical factors.

**Table 3:** Still birth clasification (Aberdeen classification) by posible causes and case fatality rate in JUHS, September 1, 2012 to September 11, 2013.

No	648 (79.3)	169 (20.7)	0.306	0.243-0.3290*	2.049	1.481-2.872*
GA	n=3413	n=373				
Preterm	14 (37.8)	23 (62.2)	2.192	0.364-0.660*	0.787	0.236-2.618
Term	925 (94.0)	59 (6.0)	1	1	1	1
Post term	103 (92.0)	1.44	1.44	0.692-2.997	1.457	0.600-3.539
Unknown	2371 (89)	2.04	2.04	1.519-2.746*	0.996	0.691-1.420

**Table 4:** Bivariate and multi-variate analysis of factors associated with perinatal mortality in JUSH, September 1, 2012 to September 11, 2013.

Variable		Frequency		Bivariate		Multivariate	
		Live (%)	Dead (%)	COR	CI	AOR	CI
Presentation		n=3683	n=357				
Cephalic		3467 (91.1)	309 (8.9)	1	1	1	1
Breech		143 (84.7)	22 (13.3)	2.19	1.349-3.564	2.02	1.848-4.829*
Face		35 (79.5)	9 (20.5)	1.75	0.732-4.203	1.19	0.313-4.563
Brow		17 (81)	4 (19.0)	2.41	0.732-7.200	1.4	0.202-9.758
Shoulder		21 (61.8)	13 (38.2)	6.33	3.40-12.755	5.96	2.10-16.85**
Mode of delivery	SVD	2375	144 (6.1)	1	1	1	1
	Forceps	214 (93.4)	15 (6.6)	1.24	0.712-2.157	0.25	0.71-2.19
	Vacuum	61 (95.3)	3 (4.7)	0.86	0.267-2.792	0.96	0.292-3.178
	C/D	885 (96.6)	31 (3.4)	0.75	0.514-1.106	0.77	0.517-1.31
	ABR	12 (28.6)	30 (71.4)	5.23	2.522-10.862*	4.07	1.856-8.917
Weight	1000-1449	29 (64.4)	16 (35.6)	3.87	1.439-10.405*	5.04	1.626-15.596**
	1500-2499	336 (79.0)	89 (21.0)	1.43	0.679-2.970	1.73	0.73-3.973
	2500-3999	2971 (92.4)	245 (7.6)	1	1	1	1
	>4000	91 (91.0)	10 (9.0)	0.86	0.443-1.677	0.54	0.244-1.213

ABR: Assisted Vaginal Breech Delivery; C/D: Cesarean Delivery; SVD: Spontaneous Vertex Delivery  
\*P<0.05, \*\*P<0.001

**Table 5:** Bivariate and multivariate analysis of obstetric factors associated perinatal mortality in JUSH September 11, 2012 to September 10, 2013

## Discussion

In this study perinatal mortality is 98.2/1000 total births which is decreased from study done in 1999 in the same hospital. This decreased probably due to increment healthy care provider and awareness women about antenatal care. However, the figure twice the national figure and comparable study done Hawassa and in capital [4,13]. This because the hospital is only referral in the study area and severe complicated case referred and managed which contributed major perinatal mortality. 71.1% of the total perinatal deaths were still births of which majorities of 98% were diagnosed from out set at admission. 60% of still is due to mechanical factors. This birth also contributes for high perinatal mortality.

Sixty percent women had spontaneous vaginal deliveries. This shows that the hospital is overwhelmed by many cases that can be managed elsewhere regional hospital and health centre. Providing service for such cases by large limit the hospital capacity to give priority for the women with serious pregnancy related complication, this would have vicious cycle on maternal and perinatal survival and death. Despite JUSH is the only referral hospital and high operative intervention and other plausible explanation why perinatal mortalities were high. The above justification can be strengthened by the fact that 60% of cause of still birth were mechanical that could be almost totally preventable if the referral system could have been appropriate and timely carried out. The other reason could be lack of awareness, inaccessible healthy facility, low income and poor transport access lead to prolonged labor and perinatal asphyxia [4,5,7,12].

Moreover, 12.8% prematurity singleton, 11.5% higher order gestation and 6.4% prematurity from twin pregnancy account 30% of the hospital as early neonatal death. 16.5% of still birth and 50% ENND were having weight < 2500 g. Although prematurity is cause of perinatal mortality worldwide; improving the neonatal unit setup may increase the survival of preterm [1,8,11].

The factors that associated perinatal mortality in this study mainly mechanical factors like obstructed labor, uterine rupture and mal presentation and very low birth weight. The major cause of perinatal mortality in developing countries almost the same which includes mechanical factors, prematurity and maternal obstetrics complication like hypertension, ante partum hemorrhage [4-7,9]. Unlike developed countries the main cause of perinatal mortalities are prematurity and congenital anomalies. The ENND is comparable to national figure, recent studies in this country and other studies in Africa and WHO figure for developing countries [4,12,14-21].

In this study gestational age, neonatal sex and onset of labor do not have significant association with perinatal mortality.

Limitation of this study, since it is Hospital based data, it does not include those still births and early neonatal deaths in the community. Hospital based data, including this study may potentially underestimate the true rate of perinatal mortality because neonates are not followed up after discharge.

To sum up discussion, intrapartum mechanical factors still the dominant cause of perinatal and maternal deaths which certainly herald the seriousness of the problem related to referral system to healthy institution and to give priority and devise to provide emergency obstetrics care in developing countries including Ethiopia.

## Conclusions

In general perinatal mortality in sub-Saharan Africa unacceptable high. The main contributing factor for high perinatal mortality are avoidable with good antenatal care, referral system and intrapartum supervision. The author also think that there additional factors that contribute for high perinatal loss in sub Sahara Africa like poverty at individual and community level.

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